THE IRON TRADE REVIEW

VOLUME XXV. CLEVELAND, O. NOVEMBER 3, 1892. CHICAGO, ILL. NUMBER 44.

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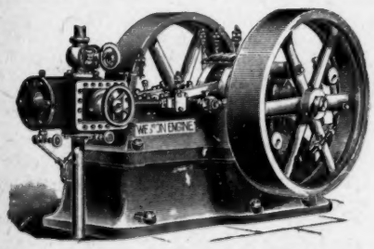

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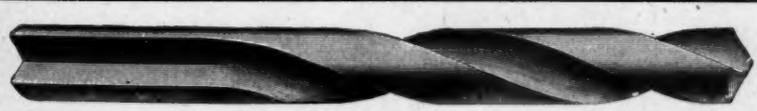

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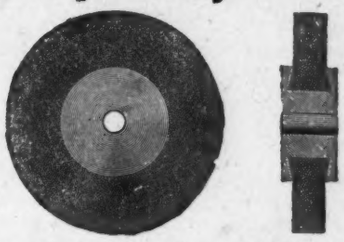

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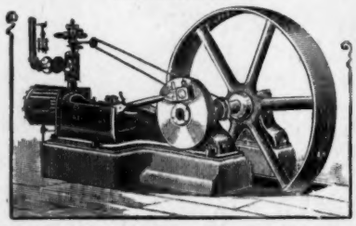

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THE IRON TRADE REVIEW

VOLUME XXV. CLEVELAND, O. NOVEMBER 3, 1892. CHICAGO, ILL. NUMBER 44.

THE WEEK IN IRON CIRCLES.

GENERAL FEATURES.

The continued upward movement of soft steel billets at Pittsburgh, and the consequent strengthening of Bessemer pig iron, are the prominent facts in the iron and steel market, the past week. From the transactions of a few weeks ago at less than $22—as low as $21.45 on one large lot—to $25.50 for early deliveries, as has been the case the past week, is a jump that gives some indication of the nervousness among steel, and incidentally suggest, that there is a very comfortable margin to the billet maker at existing prices. Some very heavy buying to cover shorts has been the feature in the Pittsburgh billet market the past week, and this speculative element is what has disturbed calculations that under ordinary conditions might be depended upon. Bessemer pig has gained distinctly in the week, as a consequence of the billet movement and sales are at about 25 cents a ton above the lowest of the past two weeks, $13.75 Pittsburgh, being the bottom now. In foundry and gray forge irons, there is the curious spectacle of Southern makers anxious for advances that Northern furnacemen are very conservative about announcing. Southern firms have of late been doing some of the curtailing in which a large number of Northern furnaces set the pace early in the spring, and some of them are disposed to force prices too rapidly, endangering the stability of the market. As a matter of fact the reductions of stocks shown on the first of September and the first of October, and the further reduction that will be reported for Nov. 1, were largely due to the persistence of certain furnace firms, including a number in the Mahoning and Shenango valleys, in remaining on the inactive list. While the blast furnace returns for Nov. 1 will show more furnaces in blast than were active Oct. 1, the inroad upon stocks has continued. Some Southern furnacemen are asking $8.75 to $9 for gray forge and $9.75 to $10 for No. 2 foundry, at Birmingham, while others report the sale of large lots for deliveries running into the summer and fall of 1893, at $8.75 for gray forge and $9 to $9.25 for No. 2 soft. Lake Superior charcoal irons are held firmly, owing to the selling up of the output of a good many furnaces for the balance of 1892. Southern car wheel irons are firm. There is an abundance of work at all the mills, except the rail mills; car works, tool works, structural mills, foundries and implement manufactories all being in full operation.

THE LOCAL OUTLOOK.

The shipments of iron ore still continue to distance even the great record of 1890. As the figures elsewhere show, with exact returns for all the prots, there had been shipped up to Nov. 1, 7,823,251 gross tons, or 382,677 tons more than at the same date in 1890, and 1,805,492 tons more than last year's shipments at Nov. 1. The end of safe navigation is so near, that it is a matter of close figuring with some vesselmen to get in two trips more, and the situation as to wheat was such at the opening of the week, that many boats went for ore, fearing that a grain blockade within another week might so delay unloading that if they took down grain this week, a second trip would be impossible. Twelve vessels were reported in Tuesday's advices from Duluth to have gone that day for ore, rather than for wheat at four cents. The possibilities of a wheat blockade may be figured out from this state of things at the opening of the week: 32,000,000 bushels at Milwaukee, Toledo, Detroit, Duluth and Chicago, and upwards of 5,000,000 bushels at Buffalo—making 37,000,000 bushels in all waiting to move forward to New York; at New York, 19,000,000 bushels, with a capacity of 26,000,000 bushels, and a current shipment abroad of about half the amount received. Under these conditions the middle of another week might see New York calling a halt. Ore freights are steady at $1.30 from Ashland, $1.10 from Marquette and 80 cents from Escanaba.

Iron Ore. Beyond some few additional sales of non-Bessemer hematites, and further inquiries for this grade, the ore market has developed no special feature. The movement forward to furnaces shows a considerably larger aggregate than at this time last year. In the past week this total has been about 40,000 tons from Cleveland docks, while Cleveland receipts have been upwards of 55,000 tons. The first train load—18 cars—of Mesaba ore was received at Duluth, Tuesday, and will form part of the first of three cargoes consigned to Oglebay, Norton & Co. The handling of Cincinnati, Hale and Kanawha ores, mined by the Standard Ore Co., has been arranged for within the week, with Corrigan, Ives & Co., and it is probable that a fourth firm will soon be added to the list of Cleveland representatives of the Mesaba range.

Pig Iron. The holding of Bessemer pig at a higher figure, is the only change in this end of the market. Valley furnaces make $13.15 their minimum now and some of them will not accept less than $13.25 at furnace. The depth reached by Bessemer in the last two weeks is emphasized by turning to our market review of just one year ago, which noted that furnacemen were standing aghast at a sale of 13,000 sons of Bessemer at $14.45 at furnace.

Finished Iron, etc. That the mills are running with plenty of orders and that the demand for sheets, plates and structural material is fully maintained, continues to be the report concerning manufactured iron and steel. New business is quite up to the volume of early Fall, and for the year thus far, exceeds that for last year to the same date. The scrap market shows slightly more activity and an advance in prices.

GENERAL MARKET RESUME.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Chicago. The market for pig iron continues to be very active, the aggregate sales for the week footing up to a very fair amount. A few sales of 500 and 1,000 tons are reported, though selling was chiefly in small lots of 50 and 100 tons. Prices are even firmer than last week, and furnacemen have no difficulty in making sales at quotations. Buyers seem to be gradually inclining to the opinion that the recent advance in prices is permanent. Charcoal iron is fairly well, and is being held by all the larger producers at $17, though one or two large buyers claim to be able to purchase all they need at $16.25 to $16.50.

BAR IRON.—Buying continues to be free, the volume aggregating quite a large amount. Prices remain unchanged. Common bar 1.65c and 1.70c.

BILLETS AND RODS.—Billets are selling quite freely and a good demand is reported for rods. Prices are as last reported. Billets, $26; rods, $35.

RAILS AND TRACK SUPPLIES.—A fair business has been done in the past week, principally in small lots. Quotations are made: Rails, $31.00 to $32.50; track bolts, 2.75c to 2.80c; spikes, 2.05c to 2.10c.

STRUCTURAL IRON.—Conditions are the same as last reported, the demand continuing large. Prices are firm and unchanged. Beams and channels, 2.45c to 2.50c; angles, 2.15c to 2.25c; sheared plates, 2.20c to 2.35c; tees, 2.50c.

PLATES, TUBES, ETC.—Tank and boiler plates continue to sell very freely, and no difficulty is experienced in obtaining quoted prices. Tank plates, 2.20c to 2.25c; shell steel, 2.50c to 2.60c; flange steel, 2.75 to 3c; fire box steel, 3.75c to 4c; tubes are selling at discounts of 55 and 57½ per cent., and 62½ and 65 per cent.

MERCHANT STEEL.—A very fair business is reported, inquiries being numerous and for large quantities. Open-hearth spring, 2.35c to 2.40; tire, 2c to 2.15c; machinery, 2.20c to 2.25c; crucible spring, 3.60c; machinery, 4.75c; tool steel, 6½c and upwards; Bessemer bars, 1.90c to 2c.

SHEETS.—There is no change in the conditions last reported, the mills still refusing to quote for immediate delivery. Galvanized sheets are being quoted at 70 and 7½ per cent., and 70 and 5 per cent. at the mills, and 65 and 10 per cent. and 70 per cent. from store. Black sheets are selling for 3c f. o. b. Chicago.

OLD RAILS, SCRAP, ETC.—The same feeling of apathy characterizes the market as has been the condition for some time past. Prices are unchanged. Old rails, $17.50 to $18; old wheels, $14; old steel rails, $12 to $13; No. 1 forge, $14; No. 1 mill, $11; turnings, $8; mixed steel, $9; coil steel, $13.50; leaf steel, $14.50; low tires, $14.50.

Pittsburgh. The situation here as regards pig iron is much the same as it was a week ago, but the advance of from $1 to $2 a ton in the price of steel billets, together with the general activity of trade, has helped to produce a stronger and more hopeful feeling among producers of pig iron. Bessemer pig is held at a slight advance, and the prices of two weeks ago cannot be duplicated now. There are no transactions reported at less than $13.75, about 25 cents higher than the lowest sale reported a fortnight ago. The billet market is a center of interest. Within the week heavy sales have been made, some of these being to cover shorts. Short sellers in billets are far from satisfied with the outlook. Spot and early deliveries of billets have been held at $25.25 and $25.50, and it is plain that the demand is in excess of the supply. From the low notch of $21.50 that billets touched three weeks ago to the present quotations of $24 on de iveries running into March. Muck bar is steady, and a transaction of 1,000 tons is reported at $24.65, deliveries November and December. Grey forge and foundry irons are unchanged and quiet.

Louisville. There has been no change in the feeling of confidence that the market is on a firm basis, and has an upward tendency. There has been no further advance in price, but $9 for grey forge, $9.25 for No. 3 foundry, and $11 for No. 4 foundry, Birmingham, are firmly maintained for deliveries next year. Of mill grades there is a scarcity, and orders for some cannot be readily filled for shipment during the next two months. The buying during the week has largely been of No. 2 foundry, and it is felt that this grade will advance in price to $10, Birmingham, and be in line with grey forge. Soft irons are strong, No. 2 soft being quoted at basis of $9.50 to $9.75, Birmingham.

Cincinnati. While the past week has not witnessed any heavy sales, the market still remains firm on the advanced prices already made. Among buyers there are differences of opinion relative to the slight advance that has already been made. Some seemingly think that it will not hold, while many are inclined to feel that not only will the present advance be sustained, but that with the incoming of the new year, still better prices will be realized, but none anticipate what might be termed a "boom," therefore are willing to take their chances with the market and buy as they require.

Detroit. The firmness in the general market reported last week, still continues, but there is less disposition on the part of buyers to place orders for any large amounts. Whether this is only a temporary falling off and foreshadows great activity a little later, can only be surmised, but that is the general feeling among sellers. Stocks are not increasing, and the large consumption that is going on would indicate a better market. However, the fact that furnaces that have been idle are constantly being added to the active list, may push production again above consumption—as was the case last year, and the same results follow. The demand has not been for any particular class of iron, but has been about equally shared by Lake Superior charcoal and Southern coke, with somewhat less call for Ohio coke. Prices on finished material have changed but little, and demand is active.

St. Louis. The past week has witnessed the heaviest buying movement for the same period of time since January 1. The market continues to improve and prices advance, contrary to the prediction of some of the heavy consumers, who would now like an opportunity to make contracts for iron, deliverable the first half of next year, at prices ruling 30 days ago. The situation, however, is decidedly in favor of the seller and buyers are beginning to realize this fact. Grey forge is firmly held at $9, Birmingham basis, and the furnaces are not overanxious for orders at this price.

Buffalo. The interest of consumers of pig iron in this vicinity has at last been awakened. The inquiry has largely increased, though it is by no means as large as it would be if the real situation was understood. Further than this, buying seems to have begun in earnest and some good-sized sales have been consummated during the past few days. Southern iron has still further stiffened, being very firm at the advanced prices. There have been some slight advances in Lake Superior coke irons with indications of further advance.

THE IRON TRADE REVIEW

DEVOTED TO

IRON ORE, IRON AND STEEL MANUFACTURE, MACHINERY TRANSPORTATION, INDUSTRIAL PROGRESS, STATISTICAL INFORMATION, ETC.

PUBLISHED EVERY THURSDAY BY

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CLEVELAND, OHIO.

CLEVELAND: 27 VINCENT STREET. | CHICAGO: 1419 MONADNOCK BLOCK.

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NOVEMBER 3, 1892.

HEAVIEST ORE SHIPMENTS TO NOV. 1.

The statement of ore shipments to Nov. 1 shows that 1892 is still a record-breaker. We are in receipt of exact figures from all upper lake docks, showing total water shipments up to the first of the month to be 7,823,251 gross tons. By reference to the accompanying table, it will be seen that for the last three months, the record has been in advance of that for the big year, 1890; for Nov. 1, the increase is 382,677 gross tons over 1890, while on Oct. 1, it was 340,250 gross tons:

	To Sept. 1.	To Oct. 1.	To Nov. 1.	For the Year.
1890.....	5,459,510	6,496,746	7,440,574	9,003,701
1891.....	3,954,510	5,056,860	6,017,789	7,011,933
1892.....	5,611,397	6,836,996	7,823,251	.....

The above showing might raise the presumption that the output of Lake Superior mines this year will be greater than in 1890, and such may be the case, since ore on stock piles, that has been raised in 1892, must, of course, be counted in reckoning production. There has, however, been a smaller volume of rail shipments this year than in 1890 or 1891, how much smaller can only be determined when the full record of the year is made up.

SKILLED LABOR IN THE FOUNDRY.

Much that is suggestive and valuable will be found in the interchange of foundrymen's views on the labor question, presented in another column of this issue. A well known foundry master, who has had large experience with men suggested the inquiry on this point, desiring to see how far his experience had been duplicated in other foundries. It is not possible to make an explicit deduction from the mass of testimony that has come to us. But we think that one point is brought out, that tallies with the experience of employers in other manufacturing lines, and that is the decrease of all-around skill and mastery of their trade, among the molders of later years. The specializing of work, that requires the mastery of one process or one line of operation, is undoubtedly the cause of the change; and this, it may be remarked, is not a peculiarity of the molding trade or of any other—it is general tendency.

That it is a step backward cannot be affirmed; that it is a necessary concomitant of the multiplication of machines and the systematizing of manufacturing operations, in order that every article may be made in largest quantity, at a minimum of cost, probably all will agree. To be a specialist in medicine, one must first be thorough master of the whole field of anatomy, pathology and therapeutics. Specialization in scientific work, likewise, comes after a general mastery of the general field, and not to the ignoring of the general and fundamental. Talk with the men who learned a trade in any manual or mechanical line, 20 and 30 years ago, and they will tell of the years of laborious work they put in, acquiring a general knowledge of that which was to be their life work. Such men count the modern practice a sign of degeneracy. In a measure they are right. There is none of the earnest, ardent, purposeful work of a man in love with the trade he is acquiring about the apprenticeships of to-day. One sees altogether too much, as one of our correspondents suggests, of the eagerness to make as many dollars as possible in the first week or month. There is furthermore in our American life an absence of that careful, plodding spirit, that marks the artisan in certain European countries.

But we had not purposed to do more than call attention to what is given elsewhere from the pens of men who have spent years in the foundry and who have studied shop tendencies from the practical side. We hope there may be further contributions to a discussion so interestingly opened.

ECONOMY OF HIGH GRADE ORES.

Charles Catlett, writing for *Yost's Weekly*, of Staunton, Va., on "The Low Price of Iron and Virginia's Opportunity," makes some suggestions that are worthy the consideration of furnacemen outside of Virginia, just at this time, when blast furnaces that stay in the race must avail themselves of every expedient that looks to more economic production. Two lines of improvement are suggested by Mr. Catlett, viz.; better furnace management and a higher grade of ore. Under the first head he says little except to suggest that as there is from $1 to $2 difference in selling price, between No. 1 and No. 2 foundry iron, and at least $1 difference in value between the grade of the varieties, there is an excellent margin for good management. He cites the case of a Virginia furnace master, whose product was of such high grade that it represented from $15,000 to $20,000 more than the ordinary working of the furnace would have yielded.

On the second source of better profits Mr. Catlett dwells at length. He bases this part of his paper on the fact that every decrease of 6 per cent. in metallic contents produces an increase of 10 per cent. in impurities. The deduction will be plain to every furnaceman. Get the highest grade of ore available in tributary ore fields. This little table illustrates the statement made above:

	Iron per cent.	Oxygen and water per cent.	Impurities (silica) per cent.	Total per cent.
60 per cent. ore.....	60	40	...	100
54 per cent. ore.....	54	36	10	100
48 per cent. ore.....	48	32	20	100
42 per cent. ore.....	42	28	30	100

Then follows another table showing the amount of raw material required per ton of iron for different grades of ore:

	Ore. Tons.	Limestone. Tons.	Fuel. Tons.	Slag. Tons.
55 per cent. ore.....	1.818	0.330	0.846	0.220
50 per cent. ore.....	2.000	0.648	0.919	0.480
45 per cent. ore.....	2.222	1.055	1.018	0.840
40 per cent. ore.....	2.500	1.520	1.141	1.180

Subtracting one set of figures fron another, the following is shown to be the saving in using the higher grade ore, per ton of iron, assuming as the basis a 40 per cent. ore:

	Ore. Tons.	Limestone. Tons.	Fuel. Tons.
45 per cent. ore.....	0.278	0.465	0.123
50 per cent. ore.....	0.500	0.872	0.222
55 per cent. ore.....	0.682	1.190	0.295

The deduction is made, by the use of this table, that the capacity of the furnace is increased about 20 per cent. for every increase of 5 per cent. in the metallic contents of the ore. Mr. Catlett observes:

Assuming for the purposes of illustration that ore costs $2.25,

limestone 75c. and fuel $3.50 per ton delivered at the furnace, and taking a 40 per cent. ore as the basis, the above figures show that the actual saving in raw material alone per ton of iron is $1.41 in favor of a 45 per cent. ore, $2.56 in favor of a 50 per cent. ore, and $3.46 in favor of a 55 per cent. ore. When to this is added an increased capacity of 20 per cent. with the same managing expenses, and the same cost for handling raw material; a decreased cost for handling slag per ton of iron; a decreased damage to the lining of the furnace, and a better control of the product, it is seen that a difference of 5 per cent. in the metallic contents of the ore used may alone determine whether a furnace is a success or a failure.

The subjoined tabulation indicates what the saving is on 100 tons of iron, from the use of higher grade ores:

	Ore. Tons.	Limestone. Tons.	Fuel. Tons.	
45 instead of 40 per cent. ore.....	27.8	46.5	12.3	$141
50 instead of 40 per cent. ore.....	50.0	87.2	22.2	256
55 instead of 40 per cent. ore.....	68.2	119.0	29.5	346

Counting the capacity of a furnace 100 tons, on a 40 per cent. ore, it would be 120 tons on a 45 per cent. ore, 144 tons on a 50 per cent. ore and 172 tons on a 55 per cent. ore. These are significant figures, but that their importance has not been appreciated, is evidenced by Mr. Catlett's comment on prevailing Virginia practice:

While there are favored localities where ore in quantity and of higher metallic contents can be obtained; and yèt a number of our furnaces are running on ore ranging from 39 to 45 per cent., with an average of 42 per cent. Some of them do not buy their ore on an analysis, but buy by the ton and pay as much for a 39 per cent. ore as for a 45 per cent. ore, thus making it an inducement to the ore miner to furnish the lowest grade that the furnace master will accept. Even those furnaces which buy by the metallic contents do not make such a sliding scale as will induce the miner to make an effort to furnish an ore of a higher grade than the ordinary working of his mine will afford. For instance: If the ore is sold at 4½ cents per unit on the cars the miner would get 45 cents more per ton for a 50 per cent. ore than a 40 per cent. ore, while an easy calculation from the above figures will show that it is worth at least 70 cents more a ton to the furnace manager without regard to the collateral saving and increased capacity.

While the practice of buying by metallic contents and on guarantees based on frequent analyses, has obtained for some years among Northern furnacemen, to most of whom the general trend of Mr. Catlett's demonstration is not new, it is probable that the net gain to the furnaceman, of paying the higher prices asked for higher grade ores has not had that thorough appreciation that this putting of the facts will awaken.

On the principle that the proof of the pudding is in the eating, Henry Labouchere, the London editor-statesman, says that "protection pudding has provided a more plentiful meal for the Americans than free trade provides for us." Lord Salisbury announced in other terms, not long ago, that it struck him very much that way, too. We have it on excellent authority that there were people in the world, some centuries ago, who would not be persuaded even though one rose from the dead, and there are evidences that their legitimate descendants are among us to-day. We do not look to see them take lesson from the observations of Salisbury and Labouchere; but we do believe that these words of experience will be profitable to a large body of our people who are satisfied to receive testimony as to the results of the British policy without traveling the experience route.

Modern furnaces have much the advantage of the older sort in the present reign of low prices for pig iron. A Mahoning Valley furnace operator, commenting on the gloomy view of the situation taken by a Shenango Valley furnacemen who had been quoted for publication, makes this point:

Perhaps the reason may be found in the fact that his furnaces are of a back number character and do not have modern improvements. The furnaces in the Mahoning Valley are all furnished with the latest improvements and can make pig iron fully a dollar a ton cheaper than he and some others in the Shenango Valley. Stocks have all been reduced in this section and we are not disposed to wail over the condition of the iron trade.

The indictments hanging over the heads of the Carnegie officials introduce us to a new crime in the calendar—"conspiracy to depress wages." Then is every labor union that plans a strike liable to indictment for conspiracy to put up wages?

The Milwaukee Fire.

The disastrous fire which took place on last Friday night in Milwaukee totally destroyed the extensive engine and machine works of Weisel & Vilter, 70 to 80 Chicago street, entailing a loss of $100,000; the machine shops of W. Topper & Sons, at a loss of $40,000, and a foundry and machine shop of Beyley & Sons at a loss of over $50,000. All three of these concerns were insured nearly to the full extent of their losses, and their plants will probably be rebuilt as soon as possible. This total loss of the firms and individuals whose places of business were burned foots up to an amount considerably over $4,500,000, over half of which is covered by insurance. It is expected that the added loss of residence property will increase the grand total to more than $5,000,000. The burned district is that bounded on the north by Huron street, on the east by Lake Michigan, and on the south and west by the Milwaukee river, and included in its boundaries a large number of dwellings, the occupants of which were rendered homeless. Help from the fire departments of the neighboring cities of Chicago, Racine, Kenosha, Sheboygan and Oskosh was sent, and financial aid to the extent of over $100,000 has already been pledged.

Heavy Forgings for the Latest Cruiser.

Lieut. W. H. Jaques, ordnance engineer, furnishes the following data concerning the shafting and other heavy steel forgings manufactured by the Bethlehem Iron Co. for the U. S. protected cruiser Olympia (Cruiser No. 6) to be launched from the yard of the Union Iron Works, San Francisco, Nov. 5. They are all of fluid compressed, hydraulic-forged open-hearth steel:

No.	Name of part.	Length of each. Ft.	Length of each. In.	Diamet'r Inches.	Diam. of hole. Inches.	Approx. wt. of each. Pounds.
2	Propeller shafts.....	39	0	16	7½	20,600
2	Line shafts.....	35	0	15¾	7½	19,554
2	Thrust "	19	5¼	15¾	7½	11,900
7	Single throw cranks[a].	9	7½	16	7½	8,400
6	Connecting rods	8	8½	.....	.....	5,000

[a]Interchangeable and reversible.

The Walburn-Swenson Manufactory Co., successors to the Fort Scott Foundry & Machine Works Co., of Fort Scott, Kan. having decided to remove to the East, where they will manufacture several patented specialties for use in those States and for export, are offering for sale their foundry and machine shops at Fort Scott. This is one of the most perfectly appointed plants in the West. Constrncted in 1886 from the most approved plans, the buildings are of large capacity, well lighted, and arranged for traveling cranes. They are situated on 13 acres of high ground, and are connected by switches with all the railroads entering the city. Their advertisement will be found in another column.

The Krupps have sent an agent to investigate the quality of iron ore deposits in Labrador, whence they hope to get a cheaper supply than they now obtain in Spain. They consume 500,000 tons per year, but they are not handicapped, as our gun makers are, by a tariff of 75 cents per ton on their raw material. Germany is experimenting with protective tariff laws, but she is not yet Protection mad. Her manufacturers are not taxed on crude material.

FOUNDRYMEN'S VIEWS.

THREE INTERESTING SUBJECTS DISCUSSED.

The Increased Employment of Steel Castings, the Results of Using Aluminum, and the Comparative Efficiency of Molders.

From inquiries that came to it, and from the number of steel castings companies incorporated of late, *The Iron Trade Review* had reason to think that along with the decadence of the forge, in the substitution of steel for wrought iron, there was quite as rapid a movement toward steel castings —one that was making itself felt in the lessened use of ordinary iron castings. To get the consensus of foundrymen on this point letters of inquiry were sent out. The matter of the use of aluminum in foundry work was also suggested by recent questions addressed to this paper. Then a foundryman of large experience, who has put some of the results of his own practice in permanent form, for the benefit of others, suggested that a question as to the comparative skill of molders nowadays and those of, say, 15 years ago would secure an interesting expression of opinion from foundry proprietors. When these three matters were brought into the compass of a circular, the inquiries took this form :

1. Are steel castings taking the place of ordinary castings and forgings, and, if so, for what uses in particular? Are the results such as to indicate an increasing employment of steel castings?

2. Has the use of aluminum been of value in your foundry work, and what proportions of aluminum and iron give the best results?

3. Are the molders of to-day more skilled and reliable than those of ten or twenty years ago, or the reverse, and why? Among your most skilled molders, what proportion are foreign born?

Answers came back in gratifying numbers and with general promptness. They were in varied phrase and of differing purport; but it is possible to indicate their trend in general statements, thus :

It is evident that the use of steel castings in place of iron castings and forgings is growing, and that the results are such as to indicate that steel castings will be used more and more.

Aluminum has not been used in foundry work to a great extent as yet. Where it has been successfully used, it increases the fluidity of molten iron and secures freedom from blow holes in the casting.

While molders to-day are considered by many of our correspondents to be as reliable as the average of their craft 15 years ago—though others dispute this—it seems to be the fact that in all-around skill they do not measure up to the old standard, because work is becoming more and more specialized and one process or a few processes are learned, rather than the trade in general.

In some cases a request accompanied the response, that no names be used in connection with the opinion given. This request is complied with in the quotations made below. Most of the correspondence is classified, the answers to the inquiries being each under its appropriate head. Some of the letters, as will be noted, are given entire.

STEEL CASTINGS IN GROWING USE.

Purposes for Which They Are Increasingly Employed.

While a few of the scores of answers received say that the writers do not note in their particular work or particular locality, that steel castings are supplanting iron castings, the testimony is almost unanimous that they are making a notable inroad upon cast iron in certain lines that are indicated in answers below :

James Lees' Sons, Cannelton, Ind., say: "We are using steel castings exclusively for propeller wheels, also for links on yacht engines and think them superior to any other metal for this purpose."

H. Brewer & Co., manufacturers of clay working machinery, at Tecumseh, Mich., say that they are using more steel castings than formerly and that each year adds to the list of parts for which steel is used.

The Sheffield Velocipede Car Co., Three Rivers, Mich., used steel castings a few years ago and they gave good satisfaction, but were found not to be a necessity.

The Jeffrey Manufacturing Co., Columbus, use steel castings in their coal mining machinery where strength and weight are important considerations.

"Steel castings are taking the place, to some extent, of ordinary castings and forgings, more, perhaps, of forgings, as in the case of straps, rods and slides for engines," writes a Northern Ohio foundryman.

Another: "Steel castings are taking the place of ordinary castings and forgings to a great extent, for various things, such as cross-heads, small connecting rods, crank shafts and gears, where strength and lightness are needed."

According to the experience of the Frontier Iron Works, of Detroit, "steel castings are taking the place of ordinary casting only where a maximum strength is required for a minimum weight, and for intricate and difficult forgings. In our experience the use of steel castings has not increased very rapidly on account of the apparent impossibility of securing castings free from blow holes and cold shuts."

The Fairfield Plow Works, of N. Fairfield, O., write: "In our business of making plows, steel for beams, mold boards and landsides is in growing demand each year, and while steel may never entirely take the place of ordinary castings, yet as the farmers learn the superiority of steel over iron as to lightness and scouring qualities we think the demand will require an increased employment of steel castings."

The Chandler & Taylor Co., of Indianapolis, Ind., makers of engines and boilers, "are using the steel castings for the crossheads, nuts and connecting rod of our engines on account of the strength, durability and neatness of design. In the crossheads we can get the same strength in a smaller piece. Connecting rods we make of cast steel because we get them more uniform in size; nuts on account of getting them without a weld."

Wm. Tod & Co., Youngstown, O.: "Steel castings are taking the place of iron castings, and to a less extent, forgings in certain places. We think the employment of them is increasing, and it would increase very rapidly were the steel castings more reliable."

The president of a large agricultural implement works says that "steel castings are taking the place of ordinary gray iron castings only where lightness and extra strength are required There is an increasing employment of steel castings but we think not greater in proportion than the increase of ordinary castings."

A New Albany, Ind., foundry firm write that steel is increasingly employed for crank shafts, gearing and rolls, and that good results have been obtained.

A Cleveland, O., response: "Steel castings are being substituted for ordinary castings, somewhat, where greater strength is required. The steel castings trade will grow yearly, but probably slowly."

The Lane & Bodley Co., Cincinnati: "We use some steel castings, and they are gradually taking the place of iron castings where strain is greater than iron will stand without increase of size."

"In many cases," Lloyd Booth, the well known Youngstown, O., manufacturer of tin plate machinery writes, "steel castings are taking the place of iron castings, and also of forgings. I would add that their general use is increasing."

Detroit Foundry Equipment Co., Detroit, Mich.: "We do not think steel castings have been substituted very largely for the ordinary castings. We are not familiar enough to speak of the substitution for forgings. Steel castings are being substituted on locomotives and engines and in a great deal of heavy machinery for the ordinary castings, but as yet we do

not think they cut a very big figure compared with the quantity that is used."

R. H. Watson, of Greensburg, Ind., believes that steel will soon take the place of iron castings, as it is now replacing wrought iron.

Of two Ohio foundry firms whose replies fall together on our table, one says that "steel castings are replacing iron in structural work, car building and all kinds of work that requires a light, strong casting," and the other notes that pinion, crank shafts, car couplings, more and more call for steel castings, and believes its use in these ways will increase.

Hubbard (O.) Foundry & Machine Co. answer: "Yes, steel is being used more and more for rolling mill work, boiler castings and for general purposes, and the result would indicate their increasing employment."

Says a Decatur, Mich., foundryman: "Steel castings are being used where strength is required and not bulk and weight. They are preferable for gear on traction engines, as the gear can be made lighter, and still be more durable."

T. H. Brooks & Co., Cleveland, O.: "Steel castings are certainly displacing ordinary castings, where great strength is required and at critical points in large machines. As competition and improved facilities increase, the price will materially lessen and the consumption and demand for steel castings grow."

A. A. Suber, Deshler, O.: "I think steel castings are taking the place of ordinary castings and forgings in a great many instances, for pinions, racks and any small, or even large, castings in which neatness and strength is taken into consideration. I think there will be an increasing demand for them."

Crawford & McCrimmon, Brazil, Ind.: "Our experience is limited and not very statisfactory, but we believe that for large gears, cranks, rolls, etc., steel is much better than cast iron. We have no data for reliable comparison but the crossheads used on some of the locomotives have a lean and hungry look that is anything but commendable."

"We have used steel castings some the past year," writes an Indiana company, "for pinions where great strength was required, and for some other purposes, and think they are quite superior to the best gray castings."

President F. E. Drury, of the Cleveland Foundry Co.: "From our observation, steel castings are taking the place of iron castings to a limited extent for machinery and heavy work, but do not think they are much used so far in making light work, such as hardware specialties. We believe the use of steel castings is growing quite rapidly for use in the manufacture of machinery, and to some extent replaces malleable iron in the lighter grades of castings."

In the work the Rockwood Mfg. Co., of Indianapolis, put out, steel castings are displacing forgings for engine crank shafts and pitmans, and are used instead of gray iron in gearing for saw mills.

Pennock Bros., of the Minerva, O., Car Works, write: "Steel castings have not displaced iron castings to over 2 or 3 per cent. in the past ten years. Malleable iron and pressed steel have displaced about 20 per cent. of the cast iron formerly used."

"Steel castings are surely taking the place of ordinary castings, especially for locomotive crossheads," writes C. H. Gove, of Norwalk, O., "and in fact for any parts requiring more strength than cast iron gives. So far as I am aware, steel is giving results indicating its substitution for all light castings requiring strength."

Ohio Machine Co., Middleport, O.: "In putting up machinery for those parts in which greater strength is required than cast iron would give, and in which there must be more nearly the strength of wrought iron, the steel castings are undoubtedly best and are cheaper than the forgings. Steel castings have, in our opinion, already taken the place of cast iron to a very great extent where strength is required and too much weight would be objectionable, and this will be more the case in the future, for when properly annealed and free from blowholes they give the best satisfaction for strength."

Other answers, that repeat the testimony given above, might be quoted, but some answers to the contrary are yet to be referred to under this head. "Steel castings are not taking the place of ordinary castings here," write the Gall Mfg. Co., o Albion, Mich., manufacturers of plows, cultivators and other years ago. Of course there are certain shops where a large range of general work is handled, but we speak of work as we implements. Several stove founders and implement makers send a similar response. A Michigan manufactory of special railway appliances is using steel castings more extensively for gearing than ever before, "but aside from this use," the writer says, "and a very limited requirement in one or two other directions we find the iron castings which our foundry produces, suited in every way to the machinery which we build." From an Indiana car manufacturing company we have the reply: "Not to any appreciable extent. Malleable castings are, however, superseding ordinary gray castings." Probably a dozen of our correspondents, in addition to those just quoted, find that steel is not being substituted for iron castings "to any great extent."

ALUMINUM WITH IRON.

Foundrymen Have Not Experimented Very Largely.

The responses to the question relative to the use of aluminum show that there is considerable room for experimenting. Upwards of 60 of our correspondents replied either that they had not used aluminum at all in foundry work or that they had not used it enough to express an opinion as to its advantages. The Detroit Foundry Equipment Co. say: "Aluminum has been of very little value in foundry work. We think it adds very little strength, makes the iron a trifle softer than it would be if the aluminum were left out. It also increases the fluidity of the iron very much, which is an advantage sometimes. Aluminum so far is expensive and cannot be used to advantage in a foundry."

"The use of aluminum in our works," the Jeffrey Manufacturing Co., of Columbus, write, "has so far been confined to bronze castings, and the results have been very satisfactory."

"We have only used an aluminum alloy in foundry practice, to clean and soften the iron. We use five pounds to a ton."—Chandler & Taylor Co., Indianapolis, Ind.

An Ohio agricultural implement company write: "We have used aluminum, but to a small extent. We used about 1-10 of 1 per cent. We think a larger per cent. could be used to advantage, were the cost of aluminum reduced. We did not find any special advantage for ordinary work." A harvester company had this experience: "We have experimented with aluminum in our foundry at various times. We were not able to detect any difference in the strength of the castings. There is, perhaps, a little tendency to decrease the number of blowholes, but on the whole it was not worth following up for our work, in our estimation."

James Lees & Bro., of Cannelton, Ind., say that they have tried aluminum in their cupola with iron and found no improvement, but using it in a crucible with brass, the castings were much tougher.

An Ohio manufacturer of hardware writes: "In answer to the second inquiry, we have not yet found it necessary to use aluminum in our work, as our castings are all light, and turned into hardware on which there is a very fierce competition, many of our articles are put on the shelf, nicely tinned or japanned, boxed, papered and labeled for five cents, and in some cases less, per pound. So you can see we cannot put any fancy metal into our iron."

LABOR IN THE FOUNDRY.

Reasons for Differences Between To-day and Twenty Years Ago.

The labor department of our inquiry received very general attention from our foundry friends, and the expressions on this point are of special interest. They show a wide difference of opinion, each firm's experience with its employes determining its view of the reasons for the increase or decrease in efficiency of molders in recent years. The following are some of the opinions received:

Sheffield Velocipede Car Co., Three Rivers, Mich.: "It is our experience that the molders of the present day are not, as a rule, as skilled as those of, say, 25 years ago, for the reason that the class of work has largely changed; by this we mean shops have increased in size and run more to specialties, so that the molder works to a far greater extent upon a certain line of pieces, and does not get the run of the general work as he did

do it and molders as we find them. As it happens, none of our molders are foreign born."

All our molders, with one exception, learned the trade in our shop. They are all young men of good habits, and we think all Americans by birth. They are not all equally skilled, but we consider them an improvement over the old timers. —H. Brewer & Co., Tecumseh, Mich.

A Youngstown, O., foundryman thinks that "molders as a class are not as skilled or reliable as they were 20 years ago. One reason of this is that too many, instead of serving their time in learning the trade, take the road as journeymen, and another is that they are more addicted to the use of alcoholic beverages than they were 20 years ago. Among the most skilled workmen about one in three is foreign born."

Frontier Iron Works, Detroit, Mich.: "The molders of to-day are more skilled than those of 10 or 20 years ago. They are more given to a careful study of the principles of their trade, assisted by the increased number of trade and scientific journals. About 75 per cent. of our skilled molders are foreign born."

We think there is not much difference in skill and reliability, between the molders of to-day and those of 20 years ago. We have no foreign-born molders in our shop; in fact, amongst our 75 employes we have but one of foreign birth. He is a German, and one of our most skilled mounters.—Foster Stove Co., Ironton, O.

Knowledge is not skill, and while molders may have more knowledge along certain lines, we do not think they are any more skilled; indeed, we doubt if there are proportionately as many truly skilled men in the molding rooms as there were 20 years ago, and our observation and dealings with them will not warrant us in saying that they are any more reliable, in any sense of the word, than 15 or 20 years ago. Our molders are native born.—Olney & Harvey, N. Fairfield, O.

My opinion is that molders of to-day are not as skillful in the various branches, as they were years ago, owing to our loose apprentice system. The apprentice of to-day starts in, not with a paramount view of becoming a thorough mechanic, but for the amount of wages he can make at the start. An apprentice should be expected to do but a small amount of molding the first six months or year, and his wages should be correspondingly small. His work should be plain at the start, and he should not be allowed to close a mold until about perfect. Advance him from plain to difficult work, as rapidly as he is competent. If this plan were strictly adhered to molders would be more skillful, as a rule, and they could command better wages, which foundrymen could well afford to pay. I am of the opinion that the molders' organization has made a mistake in ceasing to make skill one of the requisites of admission to their order. Years ago, a molder belonging to the Iron Molders' Union could be relied upon as skillful mechanic, but not so to-day. Of the most skillful molders in Salem I am certain there is not 2 per cent. foreign born.—W. J. Ball, Salem, O.

"Specialization tends to diminish general skill," is the nutshell observation of the Dodge Manufacturing Co., of Mishawaka, Ind.

R. H. Watson, Greensburg, Ind., writes: "I have worked at the machine and molding trade for 37 years and I believe we are far more advanced and are making better and more difficult work now than 20 years ago. All my employes are native Indianians."

My experience is that the molders of to day are not as skilled as those were 20 years ago, owing largely to the imperfect apprentice system. As regards reliability they are better, for there is not so much drinking among them, and more reading and taking a general interest in affairs. American born molders are by large odds the best mechanics, quickest to adapt themselves to any change or to catch new ideas. Ours are nine-tenths American born—G. L. C., Steubenville, O.

We have been in the business but nine years, but think molders have advanced in knowledge and skill equally as rapidly as other mechanics. But they are all afraid they will make more money for their employers than their wages amount to.—Hoosier Foundry & Machine Works, Columbia City, Ind.

The Hastings (Mich.) Engine & Iron Works find more special molders than 10 to 20 years ago, but observe that good general molders are scarce.

We do not regard the molders of to-day nearly as skillful or reliable as those of ten years ago and we attribute it entirely to the molder's unions. The idea of the union is that one man is about as good as another and all should have about the same wages. Individual ambition is suppressed. A young man who would like to show his employer what he could do and attract their attention by the amount and character of his work is simply prevented from doing anything of the sort by the shop committee who generally are made up of poor workmen with ready tongues. This commtttee in a union foundry (and most of them are such) controls positively the amount of work that every man may do. This state of affairs removes the necessity for molders to improve and become skillful, and during the past ten years has very materially lowered the average skillfulness amongst molders.—T. H. Brooks & Co., Cleveland, O.

Cleveland Foundry Co. say: "We believe the molders of to-day are quite as skillful and reliable as those of 10 or 20 years ago. There is, however, a much larger number of molders working on special work outside of the machinery line than formerly, who are not as skilled as the old-time molder in all classes of work, but are very competent in the limited line in which they have been trained."

An Ohio company of engine and boiler manufacturers write: "We do not think the molders of to-day are any more skillful than those of 20 years ago. Of course there has been an improvement in tools and the greater demand and better class of work required have had their effect and have, perhaps, brought into that craft a more intelligent class of men and in this way improved it. The proportion of foreign born is about one-third, but most of these have been here from 10 to 20 years.

Rockwood Mfg. Co., Indianapolis, Ind.: The introduction of molding machinery, and the tendency of manufacturers towards specialties, whereby employes are confined to a few patterns, has in our opinion, depreciated the efficiency of molders as compared with the skilled mechanics of 20 years ago, when foundries turned out a greater variety of castings. Our molders are all 'home grown'."

Webster & Pitt, New Albany, Ind.: "With our class of work we can see little difference in 20 years. Some men have more brains and learn more quickly than others, and handle themselves and tools better, and of course do more work, but as a class they have improved but little. We have no foreign born in our shop, but our best men are of German descent, born in this country."

Few men to-day learn the trade, but instead become expert, perhaps, in some part of it. When I began my trade in 1846 we had to learn all parts, having to serve time on each branch —stove plate, hollow ware, green sand, machinery as well as dry sand and loam. Few seem to take any interest in their trade beyond getting in their day, with no hope of advancement; for none but drivers are employed for foremen now, be they skilled or unskilled. And combines have closed and bolted the door against all hope of starting in a small way and realizing more than a day laborer's wage. Thus far I have been speaking of the tradesman. With the mechanic it is different. His trade is his idol and his love. But, alas, how few tradesmen are mechanics. We have none but native born working for us.—C. H. Gove, Norwalk, O.

A Michigan firm say: "After a foundry experience of some 20 years, we are inclined to believe that there are to-day a

greater number of inexperienced molders in this country at work than at either of the dates you mention. We find it more difficult to get men of real skill in the trade now than formerly. We think a large proportion of the molders we see are American born."

Two laconic opinions of about the same purport: "Less reliable; cause, whisky and unions."—"Molders are not more skilled than they were 10 years ago. Labor organizations, whisky and beer have stood in the way of their advancement."

A. Bostwick, Millington, Mich.: "I have had a molder only two years who excels in getting good castings, and a third more than the old time molders I started with, 30 years ago.

We think molders of to-day are more skilled in their work than they were 20 years ago. At the same time it must be remembered that the demand for this work has increased very much beyond what it was 20 years ago, so that molders at the present time are not as liable to have quite as varied an experience as they were in the past. They become, however, in our opinion, much more proficient in certain lines. We think on the whole they have increased in ability very materially.—Detroit Foundry & Equipment Co.

From the proprietor of a large Ohio establishment: "We think molders of to-day are much more skilled and reliable than those of 15 or 20 years ago, mainly for the reason of the increased variety of work, and workmen in that line think more and are keeping up with the progress of the age. Our most skilled molders are native born. Not even one-tenth of ours are foreign born. We have no strikes or insubordination among our workmen."

The superintendent of a large manufactory of agricultural machinery says: "We do not consider that the molders of to-day are as skilled as those of 20 years ago. We attribute this to the fact that very few molders now serve a regular apprenticeship. Our skilled molders, almost without exception, are American born."

"The molders of to-day are not as skilled and not nearly so reliable as they were 20 years ago; in fact, we believe they are going the other way. We find they are more dissipated and more independent, although they are not known as union men in our works. They lose almost every week at least one day on account of their dissipation. There is not a day that we have our full set at work—always one or more off. We find we have 28 Americans and 13 foreigners now at work."—An Ohio manufacturer of saddlery hardware.

E. Dennis, president of the Dennis Machine Co., Jackson, Mich., writes: "We are sorry to say that molders of to-day, in our experience, are not equal to those of former years. Our reasons are that all manufacturers are working on specialties. Every manufacturer is seeking a specialty, and the molder's trade, with every other trade, is degenerating, from the fact that when a boy goes into a shop he is put at one piece or kind of work. He becomes proficient at that and his employer keeps him at it because he can make the most money of him at that. Hence he learns nothing else. As a whole, the best molders are foreign born, but the experts are mostly Americans."

These quotations might be indefinitely extended. Between 30 and 40 of those who replied sent categorical answers and did not give reasons. The tenor of perhaps two-thirds of the answers was that molders to-day are more skilled than those of 20 years ago, or equally so. Those finding more skill to-day, in most cases merely express that opinion, without going into probable causes. Those who find less skill—or less all-around skill—in nearly every instance give what seems to them an explanation of the supposed falling off. The most skilled molders, nearly all accounts agree, are native born. The majority of returns note the employment exclusively, or almost exclusively, of American-born molders. In one instance 90 per cent. of those employed are foreign born; in a half-dozen shops, two-thirds; in a half dozen others, one-half, and in a score of others a proportion of one-third or less. The proportion of foreign-born molders seems to be larger in Indiana and Michigan. The Ohio replies, with six or eight exceptions, told of very few foreign-born skilled molders.

We shall be glad to have this subject pursued further by any who have contributed to the discussion above or by any others who may read this issue, whether or not they be regular readers of *The Iron Trade Review*.

AMONG THE IRON MINES.

While this has been generally looked upon as a dull season in the iron ore business, this region, at the close of navigation, will have shipped more by half a million tons at least than were sent out last year. During the past week there have been a few sales made and increased activity is noted at some of the mines in this section. The Lake Superior Iron Co. is taking advantage of the few remaining days of this shipping season to send out some of their hematite, of which they have large stockpiles at the mine. They were operating two steam shovels.—[Iron Ore, Ishpeming, Mich.

Two Harbors shipment for the week ending Oct. 27 were 24,781. For the month, up to that date, the total tonnage was 119,428, an increase of 19,725 tons over the best previous record, that of November, 1891. Total shipments for 1892 to October 27 were 1,072,560 tons—Minnesota grades, 446,606 tons; Chandler grades, 610,499 tons; Zenith, 12,930 tons; Pioneer, 2,525. The *Iron News* says: "Matters about Two Harbors docks are very quiet, there being no arrivals outside of the Minnesota fleet and the Huron Barge Co.'s whalebacks. The number of trains between the docks and mines are being gradually decreased, there being but 1,450 car loads more to come down, of which 875 are Chandler, all of which will be down before the 15th. The Chandler will be out of way by the tenth, before the frost catches it. In October, last season, considerable delay was experienced from frozen ore."

Mr. James Corrigan, of Corrigan, Ives & Co., Cleveland, visited the Mesaba range town, Merritt, last week, in company with Messrs. Bates and Barbour, of the Standard Ore Co., and Col. H. F. Benjamin, of Milwaukee. The *Mesaba Range* has this paragraph of interview and comment: "Even before this range was discovered," said Mr. Corrigan, "the production was greater than the demand and whatever the outpnt of this range next year it will be just so much overproduction." The suggestion was made that possibly some of the mines on the older ranges would be forced out of business because of the possibility of cheap mining here. "Yes," he replied, "but that has already occurred without the influence of this range, and the old mines will make a heroic struggle before they will be forced out of business. They will cut the price of ore if they have to until there is little margin left for anybody. The mine owners of this range had better go slow; that is my advice."

The Biwabik extension of the Duluth & Iron Range road has been completed at last. Grading on the McKinley extension has begun and it will probably be completed in December. On the 16-mile branch of the Duluth, Missabe & Northern, that runs from the main line into Merritt, about half the distance has been covered. On the Virginia branch it is expected to be ready for the rails by December 1.

Increased Business Compels Enlargement.

The James Reynolds Manufacturing Co., of New Haven, Conn., are building an addition to their factory. They are putting in a new boiler and engine of increased power, made necessary by their increased business in the manufacture of molding machines, etc. The addition will be two stories containing the boiler and engine room, and two additional machine rooms.

MESSRS. E. H. Jones & Co., 54 Frankfort street, Cleveland, representing the Sturtevant system of heating and ventilation, have installed plants recently with Van Wagoner & Williams Co., Schneider & Trenkamp Co., National Carbon Co., and Aurora Vapor Stove Co., of Cleveland; Cleveland Axle Manufacturing Co., Canton, O.; Baker & McMillen Co., Akron, O.; D. J. C. Arnold, New London, O.; National Vapor Stove Co., Lorain, O.; Miller Steam Pump Co., Dixon, Ill., and Garfield Manufacturing Co., Elyria, O.

TIN PLATE PROGRESS.

GRATIFYING GROWTH OF THE BUSINESS.

Special Agent Ira Ayer of the Treasury Department reports to Secretary Foster that during the quarter ended Sept. 30, 1892, 32 firms produced 10,952,725 pounds of tin and terne plates proper, against 826,922 pounds produced by five firms during the same quarter of the last fiscal year, the production of the entire year having been 13,646,719 pounds. Of the total production for the quarter 5,920,082 pounds, or more than 54 per cent., were made from American black plates; 3,611,367 pounds, or about one-third of the whole, were bright tin plates, of which 3,337,036 pounds, or more than 92 per cent., were of the lighter class of plates mentioned in the law; 7,341,358 pounds were terne plates, of which more than 93 per cent. belonged to the lighter class.

Compared with the first quarter of the last fiscal year, the number of firms engaged in the manufacture was more than six times as great, the amount of tin and terne plates made was more than 13 times as great, and the amount of American black plates used in the manufacture was about eight times as great. The ratio of increase in the production of bright tin plates was as 1 to 23 and of terne plates as 1 to 11. The amount of American sheet iron and steel made into articles and wares, tinned or terne-coated, during the last quarter was, at a moderate estimate, based on the sworn returns of stamping companies and others during the last fiscal year and such returns received to date for the present quarter, 1,250,000 pounds. This makes the total production during the quarter of tin and terne plates within the meaning of the law 12,202,725 pounds.

ESTIMATED OUTPUT FOR THE YEAR.

On the basis of this output the production for the present fiscal year would be about 50,000,000 pounds. Should the same rate of increase continue it would give a production during the the present fiscal year of 175,000,000, and an annual rate of production at the close of the year of more than 400,000,000 pounds, instead of 200,000,000 pounds, as heretofore estimated. In the report of Aug. 15, 1892, it was shown that 14,124,781 pounds of American plates were used in the production of tin and terne plates during the last fiscal year, 9,296,553 pounds of which entered into the manufacture of tin and terne plates proper. The total production on this account during the year was about 12 times as great as that of the first quarter.

It is probable that during the fiscal year ending June 30, 1894, which will be the third year that the law will have been in force, the United States will produce an amount of tin and terne plates equal to its own consumption, nearly all of which will be made from American black plates.

There were in all 46 manufacturing companies, of which 32 were producing, 14 were building, eight were enlarging, and 20 were making or preparing to make black plates. Among the new manufacturing companies are the International Tin Plate & Refining Co., of Chicago, and the Joliet Tin Plate Co., of Joliet. The Corning Steel Co., of Chicago, Ill., started their rolling mills Oct. 3, 1892, with a prospective capacity of 100 tons of light plates daily. Norton Bros., of Chicago, are putting in new machines, made in their own shops, for tinning automatically by the palm oil process, preparatory to engaging extensively in tin plate manufactures.

Relative to prices of plates, the special agent invites attention to a letter under date of the 20th inst. from H. R. DeMilt & Co., of New York, importers and dealers in tin plate, metals, etc. From this letter it appears that on Sept. 30, 1892, the price in New York of English tin plates, wholesale from store, 14 by 20 regular, 112 sheets, weighing 108 pounds, was $5.37½ per box, against $5.45 for the corresponding date in 1891, and $5.50 for the corresponding date in 1890, which was nine months before the present law went into effect. These prices were for the usual representative brands of coke plates, such as are generally used for canning and cheap tinware. American tin plates of the same grade as the above were quoted to the firm about Sept. 30, 1892, by several American manufacturers, whose names are given in the letter, at from $5.25 to $5.35, f. o. b., at works.

WAGES AND THEIR AVERAGE.

Relative to the question of wages, figures were furnished under date of Sept. 30, 1892, by Mr. John Jarrett, Secretary of the American Tinned Plate Manufacturers' Association of the United States, and which he vouches for as correct. From these it is seen that the average of wages paid in the rolling mill work in this country is from two to three times as great as in England, and in the finishing or tinning department about two times as great. As to the aggregate of wages that the establishment of the industry will bring to American workmen, the case may be put as follows:

"It is probable, owing to the natural increases in the amount used and the stimulus given to its consumption as a domestic product, that the United States will consume two years hence at the rate of 7,000,000 boxes a year. Assuming that the average value of tin plates of all grades at that time will be $5 per box, the value of the entire yearly product would then be $35,000,000. It is stated on high authority that at least 80 per cent. of this amount would represent wages, the remainder representing the value of raw materials in the earth, interest on capital invested, profits, etc. This would mean wages to American workmen, as a result of the establishment of the industry in this country, amounting to from $28,000,000 to $30,000,000 annually.

Quick Work on Phœnix Furnace.

Since the Phœnix furnace of the Brown-Bonnell Iron Co., Youngstown, O., has been started in operation, after its relining, it has been doing good work, producing a large amount of excellent iron. It is a number of years since Manager Thomas G. Davis, of this furnace, abandoned the old-time custom of "blowing out."

Instead of blowing to reduce the ore in the furnace, and wasting coke for two or three days, he shuts off the blast and drowns out the furnace with water, and then shovels out the stock without waste, as the stock so taken out can be utilized after the furnace is in blast again. He no longer employs the sweep as used by furnace builders. The sweep is a center pole, pivoted in the center of the furnace stack, and to which is fastened an arm of such length as to sweep the proper diameter to which the bricklayer lays his brick. This method is a very tedious one, as the arm and pole are always in the way of the workmen, and prevent them from keeping a supply of brick upon the scaffold. Delays in waiting for material are frequent. Instead of following the plan described, Mr. Davis simply suspends cords from the top of the well to the top of the bosh, three or four feet apart. This serves as a sufficient guide to the bricklayers. The scaffold is kept free from all obstructions excepting the stock brick. In this way a greater number of men can be worked.

Phœnix furnace went out of blast on September 6, 1892, at 5:30 P. M. The work of drowning it out immediately commenced. It was shoveled out and was ready for the bricklayers on Tuesday, September 13. Further operations were delayed until Monday, October 3, upon which date the bricklayers commenced work at 10:30 A. M., and finished on Saturday, October 8, at 9 A. M. On the same afternoon the bell and hopper were put in and drying commenced. The furnace was ready to light on Thursday, October 13, but was delayed until Sunday, the 16th, upon which date it was lighted up at 7:15 A. M. The first cast of iron was obtained on Monday morning, the 17th, at 2:30 o'clock, the weight of iron for Monday being 35 tons. During the delays above mentioned work was entirely suspended. The furnace averages 115 tons per day the year round. It has two (pipe) hot blasts and one engine.

THE executors of John Roach, the ship-builder, will receive from his assignees, George W. Quintard and George E. Weed, about $2,000,000, the surplus of his assigned estate. During the administration of President Grant Mr. Roach began a long series of contracts to build vessels for the new navy. Secretary Whitney, in 1885, enforced the forfeiture clause in the contracts for the cruisers Boston, Atlanta and Chicago, and the dispatch boat Dolphin. After this Mr. Roach made an assignment, with liabilities amounting to $2,154,909.50. He died in January, 1887. Various reports were published at the time of the assignment regarding the extent of the assignment, and it may be a matter of surprise that so large an amount can be turned over to the heirs. The $2,000,000 will be paid to John B. Roach, Stephen Roach, Sarah E. McPherson, Emiline Roach and the children of Garret and Wm. H. Roach.

USE OF ALUMINUM WITH IRON.

BY L. E. DUNHAM.

Referring to the inquiry in a recent issue of *The Iron Trade Review*, as to the effect of a mixture of iron and aluminum in a cupola, I venture to make the following comments:

1st. Will a mixture of aluminum and iron in a cupola injure the cupola more than iron? I do not think it would; more than probable no effect would be visible, either in the melting or on the iron unless an excess of aluminum should be used, as the greater portion of the aluminum would be fluxed off.

2nd. The addition of aluminum to cast or pig iron will not produce a malleable iron. Adding aluminum to cast iron produces an effect similar to that produced by silicon, that is, it tends to convert the carbon in the iron that exists in the combined state (an excess of which in the castings producing hardness and shrinkage) into the graphitic state, thus causing the iron to be softer, freer from shrinkage and lessening the tendency to chill.

As an example to show how powerful it is in its action, sometime since I wished to obtain some samples, from which borings could be taken for analysis, from an iron that in the casting was entirely white, in which condition they were so hard and brittle that no tool would touch them.

A ferro-aluminum was used, guaranteed to carry 10 per cent. aluminum. Two ounces of this in small fragments was placed in the bottom of a heated ladle and about ten pounds of the metal allowed to run into the ladle upon it. It melted quickly and appeared to be diffused uniformly through the molten metal. Bars from this ladle were entirely grey and could be easily machined, the metal being very tough and close grained; while the castings from the remainder of the heat were entirely made up of white, hard brittle iron.

An analysis of the metal to which aluminum had been added, gave:

	Per cent.
Combined carbon	.70
Graphitic "	2.59
Total	3.29

An analysis of the white castings would have undoubtedly shown the carbon in them to have been almost entirely combined.

3rd. As to the proportions that should be used, it all depends on the purity of the aluminum. Ferro-aluminum, containing 10 per cent. aluminum, is a very convenient form in which it can be added. By adding enough of the alloy to give about 1 per cent. of the metal aluminum in the iron, it will produce additional softness in metal that has a tendency to be hard, and lessen shrinkage.

As a comparison to show the similarity of the effects produced by adding silicon and aluminum to metal in converting the greater part of the combined to graphitic carbon, I quote from R. A. Hadfield's paper, read at the New York meeting of the Iron & Steel Institute, October, 1890, on Aluminum Steel:

12 per cent. Spiegel.	Combined Carbon.	Graphitic Carbon.	Silicon.	Manganese.	Aluminum.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Before addition of aluminum	4.80	None.	.....	13.65	....
After addition of aluminum	0.93	3.45	1.30	11.75	3.19

Fracture changed after addition from usual pronounced spiegel appearance to that of No. 3 iron.

12 per cent. Spiegel.	Combined Carbon.	Graphitic Carbon.	Silicon.	Manganese.	Aluminum.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Before addition of silicon	4.10	None.	.....	11.00	.....
After addition of silicon	0.43	3.40	3.73	9.50	.....

Fracture changed after addition to that of No. 3 iron.

Generally speaking I should say that the effect produced by the use of aluminum was that of a softener.

ASHLAND, WIS., Oct. 25, 1892.

Basic Slag as a Fertilizer.

If basic slag is allowed to become hard on cooling the expense of milling often precludes its utilization as a fertilizer. If it is allowed to cool slowly it is easier to mill than when it is rapidly cooled. This is a somewhat anomalous state of things, for usually the strength of a material varies directly with the time of cooling. Dr. von Reis has investigated this matter, and his results are given in the *Zeitschrift fur Angewandte Chemie*. From a great number of analyses he has found that the hard slags all have a smaller proportion of ferric oxide (Fe_2O_3) in them than the soft slags, or, in other words, in hard slags the ratio of ferric to ferrous oxide is less than one-third, and in soft slags the amounts of ferrous and ferric oxides are more nearly equal.

Those slags which cooled slowly had more ferric oxide in them than those which cooled quickly, and the slow cooling ones crumbled much more easily and were, therefore, more suitable for fertilizing purposes. Dr. von Reis has a theory which he considers is sufficient to explain this phenomenon satisfactorily. The slag, he says, contains calcium ferrate, besides calcium phosphate and silicate. When the slag cools, this ferrate decomposes with the separation of ferric oxide, which disseminates itself in the solid state through the mass and prevents the slag from binding together as it solidifies. If the cooling be rapid there will not be sufficient time for the decomposition to occur and for the ferric oxide to disseminate itself. Consequently, the binding of the slag will be greater when the cooling is more rapid. The slower the cooling, not only will the decomposition of the calcium ferrate and the dissemination of the ferric oxide be more perfect, but more of the ferrous oxide will be oxidized to ferric oxide, and the less of it there will be to impede the dissemination of the ferric oxide by combining with it.

When a basic slag is dissolved in dilute hydrochloric acid (1 part of acid of specific gravity 1.19 to 5 parts of water) a red or dark brown residue consisting almost entirely of ferric oxide is left; this residue is much greater when the slag is soft and contains little ferrous oxide, than when the slag is hard and contains much ferrous oxide. That the ferric oxide is left insoluble is chemical evidence that it exists as such in the slag. The quantity of residue thus left by dissolving a slag in hydrochloric acid forms a rapid test as to the probability of a slag being easy to mill.

As to Smoke Prevention.

The Pennsylvania Lines in the West have adopted a smoke preventing device for their engines that seems to be entirely satisfactory to the Chicago Society for the Prevention of Smoke. The consulting engineer of the society after tests of various devices says that it is demonstrated with absolute certainty that it is in the power of the railroads at very moderate expense to equip their locomotives and operate them in such a way, as to make dense smoke from any one of them a rare thing." Philadelphia and Pittsburgh papers hold that what the Pennsylvania road can do in the West, it can do in the East. True enough, but the East will doubtless find out that a vigorous anti-smoke crusade on the Chicago plan must be waged before it can hope to get the compliance that the Chicago crusaders are able to secure.

A new smoke preventer is being attached for trial, to the boilers at Cleveland's City Hall. The apparatus is cheap, works automatically and it is claimed practically prevents smoke even where slack is used. If it is a success, the city will compel private power users to abate their smoke.

The success thus far experienced in the prevention of smoke from stationary boilers in the district covered by the Pittsburg smoke ordinance which went into effect on the first of September, has encouraged another anti-smoke ordinance which will probably be introduced into the Pittsburgh Councils at an early day. It is to include all stationary boilers in the first 13 wards, the main business portion of the city. It will not take in mills, as this is not considered wise as yet.

Chicago's anti-smoke crusaders are on the alert for an amendment which it is intimated may be introduced in their City Council, and the effect of which would be to cripple their smoke preventing ordinance. The railroad companies and tug companies are thought to have some interest in the matter.

SQUIRE & HOMER, proprietors of the Galion (O.) Foundry & Machine Shop, have built an addition, 40x40 to their foundry, making it 100x40 feet, besides core and cleaning rooms, thus doubling their capacity.

DESULPHURATION OF PIG IRON.

The removal of phosphorus from pig iron by the Thomas process has attained large proportions abroad and promises, under the impetus of the Pottstown Iron Co., to be established in this country. The removal of silicon from stock destined for the basic open-hearth process can be carried on satisfactorily by the Duplex process, leaving the phosphorus to be slagged off in the usual manner.

It now remains to attack the removal of sulphur from pig iron, so as to bring within the range of the forge and the foundry material that remains somewhat upon the outside. It has not been long since a shipment of Southern iron, said to be Bessemer, was condemned on account of the sulphur content, the phosphorus being below the ordinary Bessemer limit.

The sulphur content in the ores of the United States, while locally important, cannot be said to exercise much influence upon their treatment. If it exists as sulphide, in ores relatively free from lime, it is removed by roasting, and is of little importance in the actual production of iron, except in adding slightly to the cost of the stock ore. The cost of its removal from such ores would be more than counterbalanced by the increased reducibility of the ore, due to increased porosity. The roasting of calcareous ores containing sulphides is not attended with so great a loss of sulphur as if the lime were absent, as it retains the sulphur and is gradually converted into calcium sulphate. If the sulphur is present as sulphate mere roasting does not eliminate it.

But calcareous iron ores containing sulphides and ores containing sulphates are exceptional in this country. There is an abundance of ore not handicapped with these objections, and it will be a long time before we will have to use these less pure ores. The flux used is, in great measure, free of sulphur in any form, or, at least, contains but a small portion of this element.

The introduction of sulphur into pig iron, under the conditions generally obtaining in this country, is due to the fuel used, whether anthracite or coke. The question, then, resolves itself into one of betterment of the fuel in the first place, and, in the second place, of the elimination of sulphur from the pig iron itself.

It seems to us that we have not yet reached a satisfactory position as regards the removal of sulphur from the fuel previous to its introduction into the furnace. Much indeed has been done and works now built and building will, it is hoped, bring the matter further along year by year. The subject concerns the coke-makers and users chiefly, and the Southern furnaces more than the others. The coal washers at the Sloss furnaces in Birmingham, the Mary Lee and Standard coal mines in Alabama, and the St. Bernard mines in Kentucky, are proofs that some of the Southern coke men appreciate the situation. If all the furnaces purchasing their coke in the open market would insist upon a minimum sulphur as well as a minimum ash content we would perhaps hear less about white and mottled iron.

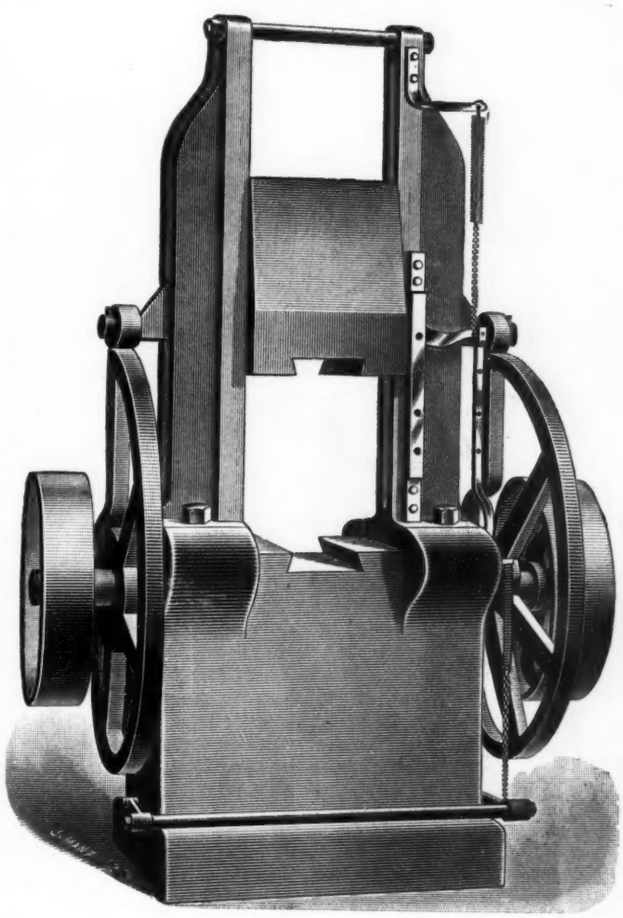
As regards the removal of the sulphur from the iron itself it seems to us to be one of the most important questions of the day, deserving all the care and money that is now engaged in its elucidation. No more important matter has come before iron and steel men since Thomas argued for dephosphorization in a basic lined converter, and it may be that some modification of his process, whereby deoxidation is effected in a similar vessel, will be found to answer all practical requirements. A basic lining, a basic flux, a deoxidizing atmosphere and a moderate heat seem to condition the removal of sulphur from pig iron.—[Engineering and Mining Journal.

THE HATCH DROP HAMMER.

W. H. Robertson, of 65 South Canal street, Chicago, general sales agent of the Hatch Hammer Co., South Milwaukee, Wis., is introducing to the machinery-using public, an improved drop hammer, of which an illustration is given on this page. It is designed for making drop forgings, straightening metal and castings, forming and welding wrought iron and steel, plow and agricultural machinery work, and all kinds of work usually done under such hammers. The aim of the inventor has been to produce a simple machine, and avoid friction rolls, eccentric shafts, gears, boards and ropes, which constitute a steady bill of expense and a factor of uncertainty.

The drop is raised by two involute cams attached to a shaft passing through the anvil. These cams raise the drop slowly at first and increase the speed as rotated, until it reaches the highest point, when it falls or is caught by the dog. The cams work against rolls, turning on the end of arms projecting from the sides of the drop, and are covered by iron shields not shown in the cut. Pressing down the treadle releases the dog, and the drop falls. By means of a special arrangement the treadle cannot be made to trip except at the right time, and cams must be in motion. This avoids accidents when the machine is at rest, or when changing dies. Holding down the treadle gives continuous blows. The stroke may be changed from six to 36 inches by various arrangements furnished by the makers.

When different strokes are wanted a three-step cam is furnished which gives three different strokes and covers all ordinary wants. This feature can be made to suit any special



requirements. The change from one stroke to another and setting the catch dog on the upright to correspond is made in a few minutes' time. The cams taking hold on each side raise the drop evenly and without jerk or strain on the uprights. The drop has square bearings in the uprights, with enough bearing surface at the top and bottom to insure accurate working, this form giving better results and withs tanding "side blow" work better than the usual V shape. The guides are made heavy and have the usual side adjustment at base, and have a binding rod at the top, with greater distance between than usual, for die space. The hammer can be driven in different ways, either direct from main line or by countershaft having several pulleys arranged cone fashion like a lathe, for different speeds, with corresponding pulleys on hammer shaft.

It is also said to be very economical in the use of power, as shown by two four-inch single belts running a 1,000 pound drop, where other hammers require two eight-inch double thick belts. These hammers are made in all sizes from 50 to 2,000 pound weight of drop. The best material and workmanship are employed in their construction.

THE BRIGHTMAN MECHANICAL STOKER.

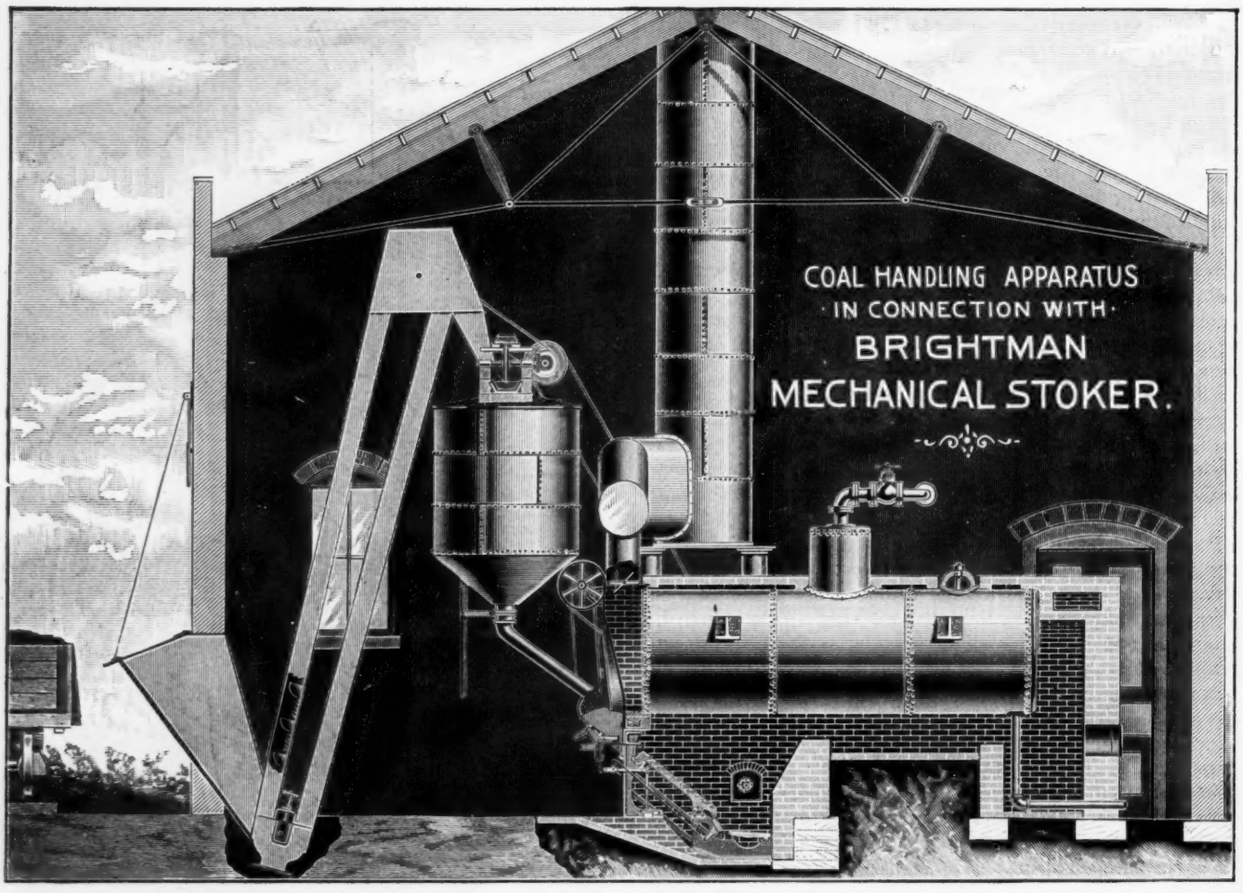
A boiler equipped with the Brightman mechanical stoker is illustrated in the accompanying engraving. It is noticed that a complete system of feeding fuel is represented. The special means adopted for conveying the fuel to the furnace is incidental, as other devices may be employed. Beginning with the furnace, it may be stated that the hopper in front of and below the flue-cleaning doors is attached to the front and extends across it, its length being equal to the width of the grate surface. The bottom of the hopper is a cast iron feed table which extends into the furnace as far as the front ends of the grate bars. Sliding on the feed table is a "pusher" three inches in height having a horizontal reciprocatory motion. By its action the fluid is periodically crowded into the furnace, being delivered upon the forward ends of the grate bars. Motion is communicated to it by a heavy cast iron rocker, and the extent of the reciprocating movement, and consequently the feed of the fuel, may be controlled and varied by means of a rack and pinion feed adjuster. The rate of feed may also be altered by changing the belt on the cone pulleys. Provision is made so that the feed may be stopped instantly and started again. The power is ordinarily furnished by a small vertical engine, but it may be derived from a line shaft, or hand power may be the operating agency.

The arrangement of the grate bars is such that the great desideratum in a furnace is secured. The air supply is presented to the fuel in the most advantageous form, *i. e.*, in an extremely divided state. It enters through the great bars, not in a score merely, but in a multitude of small apertures. This result is affected by the following construction: The grate bars are inclined at an angle of about 34° from the horizontal, and are made with lateral projecting lugs overlapping each other. By this construction vertical openings through the grate are avoided, and the grate waste often occurring by fine fuel falling through the bars is prevented. The overlapping lugs, however, are at a sufficient distance from each other to afford ample horizontal openings into the burning fuel, so that a plentiful supply of air is provided for combustion, and at the same time the bars are kept comparatively cool, and in consequence are not warped, melted or burned out.

Each alternate grate bar is stationary; the others have a reciprocatory and longitudinal motion communicated to them.

The fuel is delivered at the top of the grate, and the motion of the bars causes it to move regularly down the inclined surface toward the rear of the furnace. All fuel moves simultaneously, and this movement is positive and uniform, insuring a constant thickness of incandescent fuel. The motion of the the grate bars may be varied from one-fourth of an inch to an inch in accordance with the nature of the fuel, the draught and the character of the service. The adjustment is made quickly at any time without stopping the machine. This constant movement of the bars prevents the formation of clinkers. Nearly all the fuel is consumed on the inclined grate, and the feed is to be regulated accordingly; all clinkers and ashes and other incombustible matter and some unburned fuel pass from the principal grate to a *pit grate*, situated eight inches below the rear end of the principal grate, which is formed of ordinary bars, one-half inch thick by two inches wide, with spaces of half an inch between them.

The unburned coal is consumed on the pit grate; the ashes fall through to the ash pit below. The clinkers remain on the grate and their heat contributes to raise the temperature of the air entering the furnace.

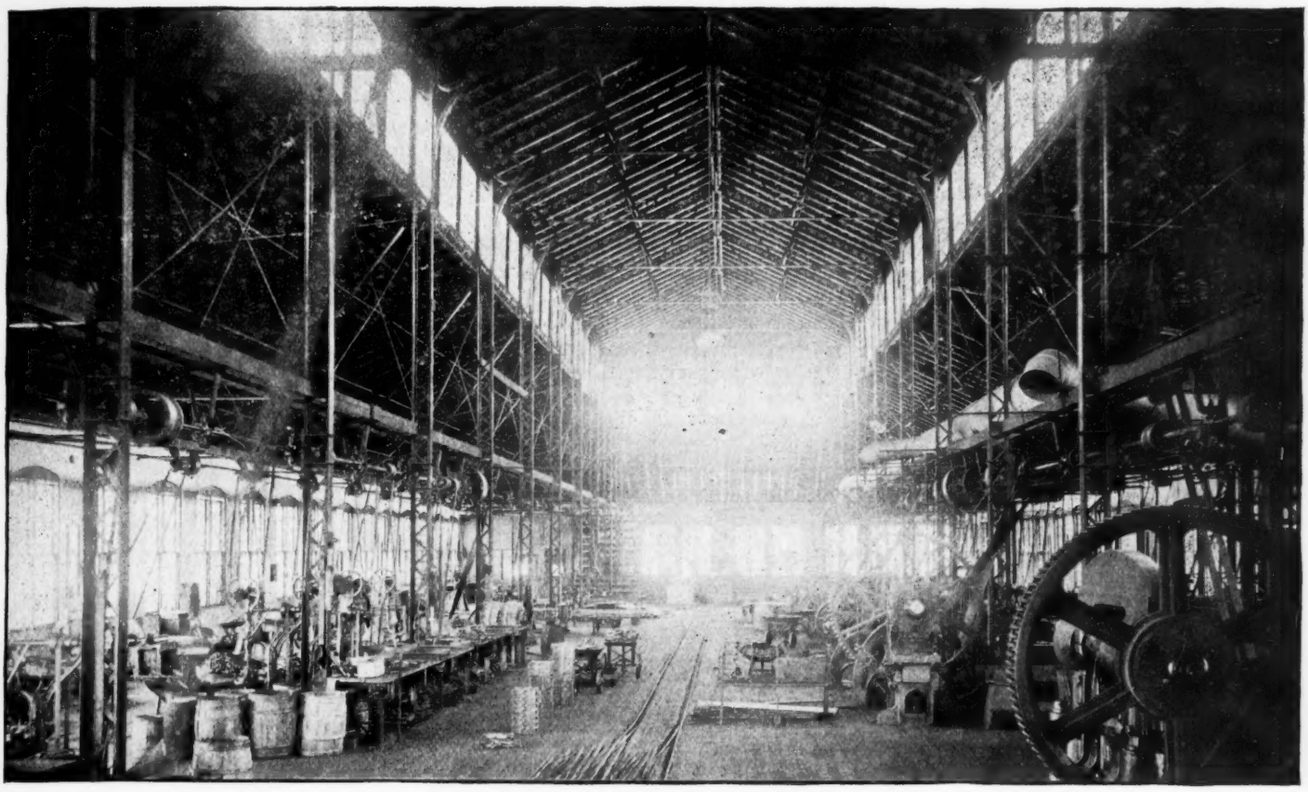


One of the great advantages of the Brightman furnace lies in the fact that when it is used, little or no smoke is produced, because the combustible gases resulting from the decomposition of fuel are immediately and entirely consumed; in ordinary furnaces, as a consequence of incomplete combustion, these gases are more or less condensed and pass off in the form of smoke.

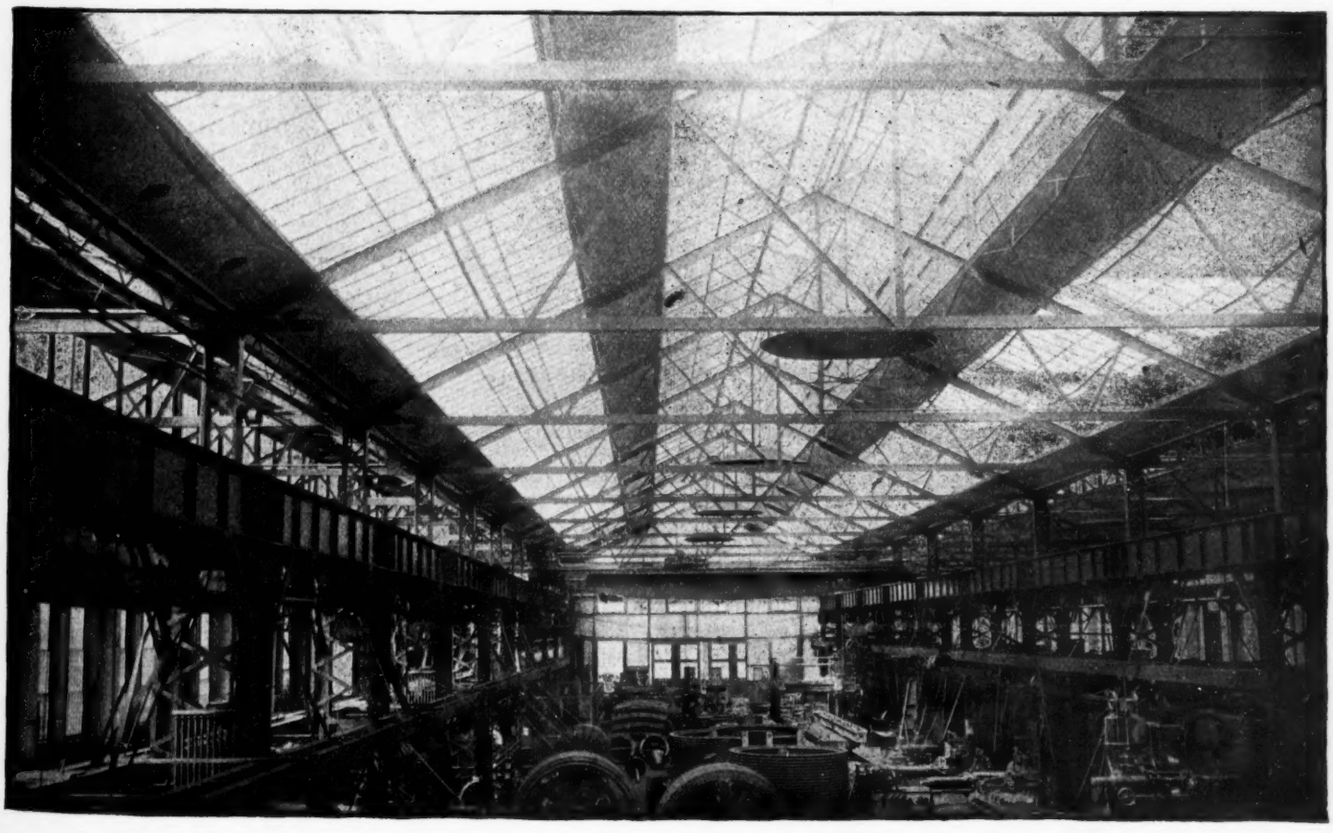
The tests that have been made with the Brightman furnace seem to indicate a remarkable fuel economy. It has been demonstrated that it will supply from 15 to 30 per cent. more steam using slack than flat grade furnaces produce with the same weight of like fuel. The labor economy is still more marked. The labor required for boiler attendance is less than one-half that necessary in the case of a flat grate furnace. It may be stated that the stoker is applicable to any style of steam boiler and to any of the patterns of fronts in common use. The stoker is manufactured by the Brightman Stoker Co., of Cleveland, O.

TYPICAL MACHINE SHOP CONSTRUCTION

The Variety Iron Works Co., of Cleveland, O., who design and manufacture steel or iron bridges, roof and viaducts, steel or iron buildings, girders and turn tables, have had an extensive experience in all these lines. Their business has seen a steady growth for years and two plants are now fully employed, works No. 1 being Nos. 59-89 Scranton avenue, and works No. 2 Hamilton street, near Case avenue. The illustrations given on this page show two pieces of Variety Iron Works Co. construction, the Walker Manufacturing Co.'s machine shop including steel roof trusses, columns, cranes and crane girders. "Utility, rigidity and economy," are the claims made by the manufacturers for their construction work.



INTERIOR VIEW CLEVELAND HARDWARE CO.'S MACHINE SHOP, CLEVELAND, O.



INTERIOR VIEW CENTER BAY, WALKER MFG. CO.'S MACHINE SHOP, CLEVELAND, O.

MACHINE FOR ROLLING HOLLOW RODS.

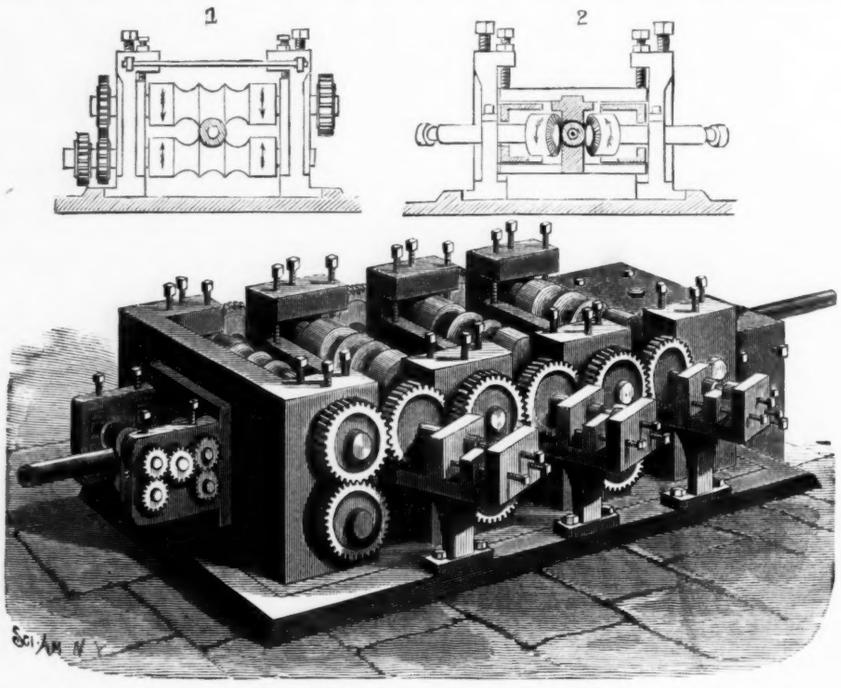
John S. Griffin, of Portland, Ore., has invented a machine for manufacturing hollow rods or bars from previously heated hollow ingots. It is simple in construction and durable, and produces a tube of uniform size. The invention consists, in brief, of pairs of horizontal reducing-rolls and a pair of disks arranged between each two adjacent pairs of reducing and stationary guides between the pairs of rolls and disks. The accompanying illustration shows the machine in perspective. Of the smaller cuts, Fig. 1 is an elevation of the inlet end of the machine, the guide or feed rolls being removed; Fig. 2 is a transverse section of the improvement. The improved machine is provided with a suitable base, on which are erected pairs of standards, placed one in front of the other. In suitable bearings, held in the pairs of standards, are mounted to turn pairs of rolls. Each of the rolls is formed with several annular curved grooves of varying sizes for reducing bars or rods of different diameters. Each pair of rolls is secured on shafts geared together by gear-wheels, one of the shafts being driven by being connected with suitable machinery. Thus when the driven shaft is rotated, the two rolls of a pair rotate together in unison.

Between two adjacent pairs of rolls is placed a pair of disks, arranged opposite each other and secured on transversely-extended slightly inclined shafts mounted to turn in suitable bearings in brackets, secured on the base. The axis of the shafts is midway between the two rolls of each pair, so that the ingot passing through the annular groove of the rolls passes centrally between the faces of the disks. The disks are somewhat beveled at their faces, the beveled part being serrated, so as to twist the ingot when the latter passes between the two disks. In order to facilitate the twisting, the two disks are mounted to turn in opposite directions, the shaft of the disk being for this purpose provided with a gear wheel in mesh with a gear wheel, secured on the shaft of the lowermost roll of the pairs of rolls. The shaft of the disk carries a gear wheel in mesh with a gear wheel on the shaft of the uppermost roll of the pairs of rolls.

The operation is as follows: The previously-heated hollow ingot is passed onto the feed-rollers, which deliver the ingot to the first pair of reducing-rolls. These reduce it and pass it between the first pair of blocks to the longitudinally-extending guides, and between the first pair of disks which, by their serrated beveled faces and by their rotating in an opposite direction, twist the bar or rod, at the same time moving it forward so that it is rolled and twisted, to be finally guided by the next pair of blocks to the second pair of reducing-rolls. These again reduce the bar or rod and move it forward to be treated in a similar manner by the next pair of disks and guides, to pass then to the third pair of reducing-rolls, then through the last pair of disks and dies to the last pair of reducing-rolls, in which the bar or rod is about reduced to the proper size. It then passes into the finishing-rolls, which remove any irregularities which may then be upon it. It is understood that all the rolls and disks are rotated in unison, being driven by suitable machinery.

The claim of the inventor is the combination, in a machine for rolling hollow bars or rods, with pairs of reducing-rolls, of a pair of disks arranged between each two adjacent pairs of reducing-rolls, the said disks being mounted on shafts inclined to the axes of the reducing-rolls and turning in opposite directions, stationary guides arranged between two adjacent pairs of rolls and disks, and a pair of finishing rolls arranged vertically.

Mr. Griffin's casting machine for molding the hollow ingots ready for the rolling machine, herewith illustrated, has been described in a previous issue of this paper. He has patented also a machine for manufacturing armor-piercing shells and other projectiles from open-hearth steel. The molds of his casting machine are slightly modified to make the ingots for the projectiles.



MACHINE FOR ROLLING HOLLOW RODS.

In the Valleys.

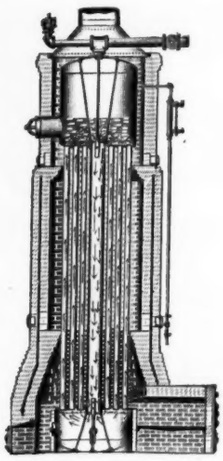
The Youngstown Foundry & Machine Co. are very busy now with special work, tin rolls, special steel mill and general rolling mill work. They have large orders ahead, many from foreign points.

Summers Bros. & Co., of Struthers, O., are crowded with orders and are operating all departments.

A convention of rollers, heaters, roughers and catchers of the Mahoning and Shenango Valleys and the Pittsburgh district was held in Pittsburgh last Saturday evening to perfect the Finisher's Association, which will act independently of the Amalgamated Association of Iron and Steel Workers.

Every rolling mill in the Mahoning and Shenango Valleys is running full time and most of them have orders that will keep them running for two or three months to come.

The following valley furnaces have resumed operations this fall after several months' shut down: The Hannah Furnace, of the Mahoning Valley Iron Co.; Mary Furnace, of the Ohio Iron & Steel Co.; Mattie Furnace, of the Girard Iron Co.; Phœnix Furnace, of The Brown-Bonnell Iron Co.; Pierce Furnace, of Pierce, Kelly & Co., Sharpsville. The Tod Furnace, of Youngstown, Steel Co., and Ella Furnace, of Wheeler Furnace Co., are now being put in readiness to start up. The capacity of each of these furnaces has been increased from 10 to 20 per cent.



THE AULTMAN & TAYLOR MACHINERY CO.,

MANSFIELD, OHIO, U. S. A.

SOLE BUILDERS OF THE

Cook Patent Water Tube Boiler.

THE ONLY PERFECT WASTE-HEAT BOILER.

No incrustation.
Generates the greatest amount steam with least amount heat.
Repairs reduced to a minimum.
Can be used equally as well for direct firing or with natural gas.

WE ARE ALSO BUILDERS OF

HORIZONTAL, TUBULAR, AND FLUE BOILERS, LOCOMOTIVE, FIRE BOX AND ALL OTHER STYLES OF BOILERS, OIL TANKS AND WATER STAND PIPES.

Estimates furnished promptly on receipt of specifications.

Main Office, 320 The Rookery, Chicago. **SOUTH CHICAGO FOUNDRY CO.,** **WORKS,** South Chicago.

SEMI-STEEL **Rolling Mill Heavy Machinery and Strong Chilled Castings, Smelting Kettles and Acid-Proof Metal.**

INDUSTRIAL SUMMARY.

New Enterprises:—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trade:

Chicago, Ill.—Reimann Co.; capital, $200,000; for general manufacturing; incorporators: Gustav L. Reimann, James A. Sheriffs, Edwin M. McKinney.

Chicago, Ill.—Chicago Naphtha Motor Co.; capital, $40,000; to manufacture and sell machinery; incorporators: A. Parker, Geo. M. Savage, Fred M. Cleary.

Chicago, Ill.—Chicago Fire Arms Co; capital, $100,000; to manufacture and sell fire arms; incorporators: Chas. E. Corrigan, James G. Kirk, Wm. G. Cooke.

Chicago, Ill.—Barr Wheel & Foundry Co.; capital, $100,000; to manufacture car wheels and general foundry business; incorporators: H. R. Walker, H. Kendall, H. A. Walker.

South Lyon, Mich.—South Lyon Manufacturing Co.; capital, $20,000; for manufacturing sanitary specialties and plumbers' wood work; Wm. Craig, Jos. W. Hatley, A. D. Forsyth, South Lyon, Mich.

South Chester, Pa.—The Vulcan Works, capital, $50,000; for manufacturing of iron or steel, or both, etc.; incorporators: W. H. Green, Wm. H. Green, Jr., Margaret J. Green, South Chester, Pa.

Chicago, Ill.—W. H. Cosper Co.; capital, $10,000; to manufacture and sell weather strips, also machinery, etc., for same; incorporators: Joseph W. Taft, Clarence B. Bishop, Edward T. Comstock.

Grand Rapids, Mich.—Grand Rapids Vapor Stove Co.; capital, $25,000; for manufacturing oil and gas stoves; incorporators: T. J. Lucas, Felix Rainville, T. Stewart White, Grand Rapids, Mich.

Chicago, Ill.—Bi-Metallic Wire Co.; capital, $150,000; to manufacture, sell and work in bi-metallic and all kinds of wires and metals; incorporators: Wm. Taylor, Wells Goodhue, Henry D. Ames.

Kankakee, Ill.—Hickey Wire, Iron & Brass Works; capital, $10,000; to manufacture, buy and sell wire, iron and brass goods; incorporators: Michael H. Hickey, Stephen R. Moore, Tressie O. Hickey.

Sterling, Ill.—Dillon-Griswold Wire Co.; capital, $200,000; to draw and manufacture wire nails, barb wire and wire products; incorporators: Washington M. Dillon, John G. Manahan, Moses Dillon.

Chicago, Ill.—Illinois Register Co.; capital, $100,000; to manufacture registering devices, street railway supplies, and metal novelties; incorporators: Theodore Starrett, Paul Starrett, M. H. Allison.

Chicago, Ill.—Pier Movable Sidewalk Co.; capital, $150,000; to construct and operate patented movable sidewalk on World's Fair grounds; incorporators: Wm. E. Furness, Joseph L. Silsbee, Samuel A. Treat.

Chicago, Ill.—North Western Co-Operative Construction Co.; capital, $1,500,000; to build and erect dwellings, buildings and structures as contractors; incorporators: Chas. Williams, Geo. Richards, Orin Stanford.

Buffalo, N. Y.—The Buffalo Iron & Steel Co.; capital, $25,000; for the purchase and sale of iron, steel and scrap metals; incorporators: David H. Friedman, Eugene L. Falk, Jas. W. Tillinghast, Buffalo, N. Y.

Chicago, Ill.—Badger Furnace Co.; capital, $50,000; to build, own and operate blast furnaces, buy, sell and deal in iron ore, pig iron, etc.; incorporators: Cornelius V. Smith, Henry A. Ritter, John G. Campbell.

Chicago, Ill.—The R. D. Swisher Manufacturing Co.; capital, $25,000; to manufacture rubber and steel stamps, type, stencils, seals, specialties, novelties, etc.; incorporators: R. D. Swisher, Cassius F. Moore, H. S. Folger.

Shelbyville, Ill.—Garis-Cochrane Dish-Washing Machine Co.; capital, $60,000; to manufacture and sell dish-washing machines; incorporators: Geo. D. Chaffee, J. G. Cochrane, Rew L. Garis, J. L. Donthit, H. M. Baldwin.

Toledo, O.—The Baker Metal Wheel Co.; capital, $50,000; for manufacturing metal wheels, bicycles, carriages, buggies, farming implements, etc.; incorporators: Barney R. Baker, Wm. H. Tucker, John J. Grieshaber, Sylvester Brown, Emil Minch.

Harpers Ferry, W. Va.—The Coles Flue Expander & Beader Co., capital, $2,000,000; for general manufacturing business and especially an improved form of flue expander and beader; incorporators: A. J. Pickrell, Jr., C. B. Gentry, Joseph Coles, all of Aspen, Col.

Cincinnati, O.—The Clipper Manufacturing Co.; capital, $14,000; for manufacturing and selling household and other specialties of tin, iron, brass, wood, etc.; incorporators: Charles J. Taylor, John B. Beall, Alexander L. Parker, Henry R. Sillman, Chas. L. Doughty.

Pittsburgh, Pa.—Frank-Kneeland Machine Co.; capital, $150,000; for the manufacture of iron or steel or both, or of any other article or metal, from metal, wood or both; incorporators: Isaac W. Frank, Allegheny, Pa.; Edward Kneeland, Pittsburgh, Pa.; Jas. J. Donnell.

New York, N. Y.—Manhattan Plumbers Supply Co.; capital, $100,000; for the manufacture and sale of plumbers supplies; incorporators: Wm. Ottman, 470 W. 22nd street, New York, N. Y.; Victor A. Shimmel, 156 W. 34th street, New York, N. Y.; Rockwood Puffer, Boston, Mass.

Albany, N. Y.—American Road Improvement Co.; capital, $300,000; for the manufacture and sale of road machinery, to construct roads and quarry stone; incorporators: J. Russell

PROTECTING YOUR BUILDING With an automatic fire sprinkler system makes it absolutely fire proof. All Insurance Companies recognize the "Neracher" as the best made and will make liberal reductions on your present rates if you equip. In this way the system pays for itself inside of two years' time. ☞ Write us.

THE NERACHER SPRINKLER COMPANY,

WARREN, O.

BRANCH OFFICES:

Boston, Chicago, St. Louis, Cleveland, Cincinnati, Minneapolis, Pittsburgh, New York, Philadelphia, Baltimore, San Francisco.

Parsons, Hoosick Falls, N. Y.; P. Callanan, South Bethlehem, N. Y.; A. R. Brown, Boston, Mass.

Cleveland, O.—The House-Milner Manufacturing Co.; capital, $25,000; for manufacturing and dealing in piano stools, office, store, household and all other kinds of furniture, etc.; incorporators: Samuel R. House, Albert R. Milner, Everett J. House, R. D. Carroll, Herbert G. House.

New York, N. Y.—Geo. A. Feld Co.; capital, $23,000; for the manufacture and sale of supplies for stoves, ranges, etc.; incorporators: Geo. A. Feld, 162 E. 129 street, New York, N. Y.; Louis Pfingstag, 162 E. 129 street, New York, N. Y.; Chas. Schnell, 322 W. 41 street, New York, N. Y.

New York, N. Y.—Horse Owners' Horse Shoe Co. (incorporated in W. Va.); capital, $2,000,000; for manufacturing and selling muck bars, billets, horse shoe shapes, horse shoes, railroad spikes, etc.; incorporators: H. W. Blair, Manchester, N. H.; N. T. Sprague, W. H. Hazzard, Brooklyn, N. Y.

Rochester, N. Y.—Hoffman Wagon & Carriage Co.; capital, $20,000; to manufacture and repair wagons, carriages and sleighs; incorporators: Henry Hoffman, 413 N. St. Paul street, Rochester; Geo. J. Hoffman, 413 N. St. Paul street, Rochester, N. Y.; Amelia Hoffman, 207 Court street, Rochester, N. Y.

Muncie, Ind.—Muncie Iron & Steel Co.; capital, $50,000; for the manufacture and sale of merchantable iron and steel, and articles and things, goods, wares and merchandise composed of iron or steel or both and conducting mercantile operations; incorporators: Jno. Griesheimer; Edward Tuhey, Richard McGauley, all of Muncie, Ind.

Yonkers, N. Y.—The Eickemeyer, Field Manufacturing Co., the above is formed by consolidation of "The Eickemeyer Field Co., Eickemeyer Dynamo Co.," and "Yonkers Machine Co."; capital, $1,000,000; for the manufacture and sale of electric machinery and equipments; incorporators: Edward A. Nichols, 13 Astor Place, New York, N. Y.; Henry Osterheld, Yonkers, N. Y.; Stephan D. Field, Yonkers, N. Y.

Atlanta, Ind.—The Indiana Tin Plate Manufacturing Co.; capital, $200,000; for manufacturing and selling iron, steel bars, tin, terne and black plates, galvanized sheets, etc., constructing building and machinery for manufacturing same, establishing electric light, heat, power and water works as is necessary for operating said business, etc.; incorporators: Enoch Stanford, Elwood, Ind.; Matthew P. Elliott, Kokomo, M. V. B. Newcomer, Tipton, Ind.

News of New Enterprises, Machinery Wants, Etc.:—

A new company will be formed to bid on the Ft. Payne, Ala., steel works, which are about ready to be put in operation. There are two basic furnaces and a rolling mill with machinery costing $30,000. It is on the line of the Alabama Great Southern railway.

Work has begun on the new $100,000 plant of the Standard Stamping Works, St. Louis, Mo.

Work has begun on the York Iron Co.'s plant at Duluth, and it is expected it will be completed by Jan. 1.

Maxwell Rowland & Co., Philadelphia, have incorporated, capital $100,000, for the manufacture of shovels, spades, scoops, forks, etc.

The McAnulty Mill Furnishing Co., of Manheim, Pa., whose buildings, 66x88 and 40x80, were erected the past summer, are now ready to fill orders.

The Belle City Malleable Iron Co., of Racine, Wis., has been incorporated with $40,000 capital. Joseph Fischer, Chas. Wilhelm and Frank R. Ellis are incorporators.

The Granite City Steel Co., of Granite City, Mo., has been incorporated with a capital stock of $1,000,000. Incorporators: F. G. Niedringhaus, Wm. F. Niedringhaus and others.

The Agnew Stove, Roofing & Cornice Co., of Findlay, O., who manufacture galvanized iron cornices and do a general line of galvanized iron work, are ready to fill orders.

Magnolia Light, Heat & Power Co., of Warrensburg, Mo., has been incorporated; capital, $20,000. Incorporators, W. P. Hurt, A. M. Zimmerman, John T. Cheatam and others.

Ground has been broken at St. Joseph, Berrien Co., Mich., by L. L. Wood, for a large foundry and machine shop, for the manufacture of all kinds of machinery and iron work, especially the Acton brick machine.

A $100,000 stock company has been organized to erect nail works and puddling mill at Norfolk, Va. E. White is president, and M. Umstader vice-president. Site for the plant has been chosen.

The Cambridge Corrugating Co., of Cambridge, O., recently incorporated, will manufacture steel and iron roofing, spouting, mixed paints and metal products. Their works are now in operation and they are ready to fill orders. They are in the market for spouting and stove pipe machinery, crimping rolls, etc.

The Snowdon Mfg. Co., of Brownsville, Pa., are incorporated to manufacturer shafting hangers and couplings. They have a two-story building 60x120 feet, and two buildings 80x80 each. They are in the market for steam hammer, bolt cutter and pipe machinery. Ready to fill orders Dec. 1. S. Crolley is superintendent.

The Buffalo Car Mfg. Co. have recently bought several acres of land in South Buffalo, N. Y., for the big manufactory they are to put up in the next three or four months. Geo. W. Miller, president of the Buffalo Car Mfg. Co., and several New

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick.

GOVERNMENT ⁂ STANDARD.

Established 1841. Capacity, 60,000 Per Day; 18,000,000 Per Year.

The First Manufactory of its Kind in the U. S.

Home Office and Works:—MOUNT SAVAGE, Allegany County, Md.

Branch Offices:—No. 1 Broadway, New York, N. Y.; No. 222 So. Third St., Philadelphia, Pa.; Lewis Block, Pittsburgh, Pa.

WANTED FACTORIES TO LOCATE AT ALPINE HEIGHTS.

Situated on the Wabash R. R., 23 miles from Chicago's Court House.

CORRESPONDENCE SOLICITED.

W. W. WATSON & CO., - - - 225 Dearborn St., Chicago, Ills.

DIAMOND W&B DRILL

THE WHITMAN & BARNES MFG. CO.,

Manufacturers of DIAMOND BRAND TWIST DRILLS.

FACTORIES AT
Akron, O.; Syracuse, N. Y.; Canton, O.; St. Catharines, Ont.

STORES AND WAREHOUSES AT
Boston, Mass.; New York, N. Y.; Philadelphia Pa.; Cincinnati, O.; Chicago, Ill.; Kansas City, Mo.; San Francisco, Cal.; London, Eng.

York capitalists are in the enterprise. The capacity of the works will be 500 wheels a day and several hundred men will be employed.

The Coventry Machinists' Co., of America, a branch of the Coventry Machinists' Co., of Coventry, Eng., will build a large establishment at Richmond, Ind. There will be four buildings. One will be three stories, 55x250 feet, one two stories, 60x100 feet, the other two stories, 40x60, and another two stories, 60x80 feet. They will be of brick, with mill constructed interior, and machinery for the manufacture of bicycles. With equipment the total cost will be $100,000.

Additions, Enlargements, Removals, Etc.:—

Fall River (Mass.) Iron Works Co. will build a new mill in the spring, near the one just completed.

The Columbia Iron Co., of Columbia, Pa., have purchased more land and will enlarge in the Spring.

The Owosso (Mich.) Tool Co.'s addition is being rapidly pushed to completion. A new boiler 5′x14′ is required.

The Reading Iron Co. will erect an enlarged building to be used as the socket department. It will be built directly over the present structure, so as not to interfere with operations, and when the new building is finished, the old will be taken down.

The Thomas Furnace Co., Niles, O., are making some extensive improvements, including the construction of an office 30x40 feet, containing four rooms and a large vault. The office building will contain all modern conveniences. Among other improvements is a pump house, a machine shop and a laboratory.

The removal of a rolling mill plant from Burlington, Ia., to Decatur, Ill., is under consideration. John W. Holiday is the Burlington promoter. The proposed Decatur plant is to cost $150,000, give employment to 400 men, with a $20,000 monthly pay-roll. Decatur is expected to take $65,000 stock with a guarantee of dividends.

The new bridge and iron works at Milwaukee, which will double the capacity of the company, of which B. Weinhagen is manager, will consist of a main rivet shop 300x300 feet; machine and blacksmith shop, 80x300 feet; forge shop, 80x100 feet; woodworking shop, 70x150 feet; office building, 50x100 feet. The output will amount to approximately 10,000 tons per annum and will consist chiefly of the heaviest class of railroad bridge work and all classes of structural iron and steel.

Fires and Accidents:—

Loss of $10,000 on machinery in the burning of P. Becker & Co.'s trunk factory, 210 West Polk street, Chicago.

A mold of molten iron exploded at the new Doty works foundry, in Janesville, Wis., seriously injuring a number of workmen.

A fire in the machine shop and brass foundry of Daniel Doncaster, Jr., Hunter's Point, L. I., caused a loss of $30,000 on building and machinery.

Fire destroyed the large moulding shops of the Bignall Mfg. Co., at Medina, N. Y. starting in the drying furnace of the pipe house. Loss is $20,000, insured.

Two Cleveland, O., fires on Oct. 28, caused $250,000 loss. The big sash and blind factory of A. Teachout & Co. was consumed with total loss. Wood Bros. tile works lose $8,000.

By a fire in Jersey City, Oct. 28, with losses totaling $210,000, Michael J. Russell's machine shop sustained $2,000 loss on building and $20,000 on machinery; Heidel & Sons' cooper shop, $25,000 on machinery.

The Stewart iron works, Wichita, Kas., were damaged by fire last week, $10,000 to $15,000, insurance $12,000. About 45 men are employed. The Stewart Bros., proprietors, will rebuild at once. The moulds in the foundry were all burned.

The Fenton Metallic Works, at Jamestown, N. Y., consisting of two buildings, containing a large amount of machinery and stock, burned down, with $160,000 loss. The insurance is heavy, but somewhat less. Rebuilding has already begun.

A great fire that swept through the heart of Milwaukee on Friday, Oct. 28, caused $6,000,000 loss. Some of the manufactory losses are: Bubb & Kipp, furniture, $300,000; J. E. Patton & Co., oils and paints, $150,000; Milwaukee Mirror Works, $50,000; Gugler Lithograph Co., $100,000; Milwaukee Chair Co., $250,000; Northwestern freight houses, contents and cars, $300,000; Milwaukee, Lake Shore & Western freight houses, $50,000; Sauer & Co., glove manufacturers, $10,000;

THE EUREKA IRON AND STEEL WORKS

Offers for sale its entire plant in the

CITY OF WYANDOTTE, WAYNE COUNTY, MICH.

—— Consisting of ——

1st: Complete Modern Charcoal Blast Furnace With shell stack, two (2) Pleyer stoves, capacity of sixty (60) tons per day together with frontage of five hundred (500) feet on the Detroit River docks and ore sheds, suitable unloading steam cranes, smithy, foundry and wagon scales, and large pig iron yard.

2d: Rolling Mill with Dock Frontage Of seven hundred seventy five (775) feet on the Detroit River, extending five hundred (500) feet more or less to Biddle Avenue, the principal business street of the city. The mill contains the following trains of rolls; one plate mill train, 72-inch finishers and 96-inch roughers; one 18-inch bar mill train; one 10-inch train: one 8-inch scrap and muck train with heating furnaces, engines, cranes and all necessary appertunances; six double puddling furnaces; six knobbling fires; steam hammer, squeezer, shears of all kinds, large spare engine with mill accommodations formerly used as a rail mill; together with foundry, gas producers, boiler, machine, carpenter and pattern shops, ice houses, fire brick and fire clay store rooms and stabling locomotives and cars:

3d: Railroad Tracks with Right of Way Conveniently situated connecting both mill and furnace and other establishments with the Lake Shore & Michigan Southern and Michigan Central Railroads.

The above property, by the addition of open hearth furnaces, can be converted into a complete steel manufacturing plant: is most advantageously situated on the banks of the Detroit River about eight miles below the City of Detroit: has complete railroad and water connections with all points, and also half hourly communication with Detroit by steam, motor and boat lines.

Large and commodious office buildings are situated on the premises.

The foregoing property is offered for sale as an entirety,
or, the furnace with its appurtenances, and the mill
with its appurtenances can be purchased separately.

This plant has been recently examined by several leading iron and steel experts, and has been pronounced by them as possessing opportunities for the manufacture of steel unexcelled in this country.

Title Perfect. No Encumbrance. For further information apply to

SIDNEY D. MILLER, Secretary,
80 Griswold Street, DETROIT, MICH.

F. P. Bohm & Co., drugs, $150,000; Weisel & Vilter, machinery, $100,000; Toepler & Sons, machinery, $40,000; Bayley & Sons, machinery, $50,000; Delaware & Quentin, tool shop, $35,000; Milwaukee Bag Co., $50,000.

General Industrial Notes:—

Eagle Iron Works, St. Louis, have assigned with assets of $10,000.

The George Stove & Range Co., Atlanta, Ga., is in the hands of a receiver.

Indianapolis bolt and machine works have orders booked for three months' operation.

The Smith-Carleton Iron Co., of Boston, recently purchased the New Bedford, Mass., iron foundry.

The Lownes manufacturing plant, of Huntsville, Ala., is putting in new machinery at a cost of $4,000.

The St. Louis (Mo.) Railing Works have made an assignment. Assets are said to be $15,000; liabilities are not stated.

A 48-ton armor plate, successfully rolled at the Homestead Steel Work, last week, has passed all inspection thus far.

The St. Louis (Mo.) Iron & Machine Works will vote on Nov. 15, on an increase in capital stock from $200,000 to $500,000.

The capacity of the Minerva furnace, at Bay View, Wis., which started up some time ago after thorough repairs, has been increased from 70 to 125 tons a day.

The Pech Mfg. Co., of Sioux City, Ia., who recently filled an order from a house in the West Indies, has an inquiry for a well-boring outfit, to be shipped to Bolivia.

The Danville, Va., Iron & Machine Works have been sold to C. T. Brown and P. J. Carter. New machinery will be added, and the works run on a more extensive scale than before.

At Denver, Col., Rhodes Bros., brokers, have sued the Colorado Coal & Iron Co. for $20,000 damages. The plaintiffs allege that the defendants agreed to purchase several thousand tons of iron pipe, but failed to keep the agreement.

Occupying more than two acres of ground at Poinsville, La., and employing 200 men, the Sulzer-Vogt Machine Co. has one of the largest plants in the South. Its boiler, tank, sheet iron and steam engine lines are prominent among the company's manufactures.

The Elwood Shafting & Tube Co., of Elwood City, Pa., struck a gasser last week that promises to furnish them fuel sufficient for a long time.

The King Iron Bridge Co., of Cleveland, have received the contracts for constructing a bridge across the Saline north of Russell, Kas., a bridge across the Saline north of Dorrance, and a bridge across Sellens creek in the same county.

It is stated that the furnace under construction at Piedmont, Ala., will be purchased and completed by the Augusta Mining & Investment Co., of Cedartown, Ga., and that they will also lease the furnace of the Cherokee Iron Co., at Cedartown.

The King Bridge Co., of Cleveland, O., have the contract for the iron work for the new rolling mill for the Brown-Bonnell Iron Co., of Youngstown, O. The mill will consist of two buildings 220x60 feet, connected by a building 50x60 feet.

The H. C. Frick Coke Co., of Pittsburgh, have just concluded the purchase of one-third interest in the Redstone Coke Works, near Uniontown, Pa., and 625 acres of coal land in North Union Township. The purchase was made from the estate of Presley H. Moore, deceased, and the consideration involved is $530,000.

The stockholders of the Georgia-Alabama Investment & Development Co., of Tallapoosa, Ga., have for some time past been endeavoring to reorganize and form a new company called the Tallapoosa Real Estate & Industrial Co. The idea is to save something out of the wreck, and to put the concern on a working basis.

The percentages of increase over the returns for 1880, as shown in the census report for Cincinnati, just issued by the Census Bureau, are these: Number of establishments reported, 101.13; capital invested, 76.70; number of hands employed, 58.56; wages paid, 119.20; cost of materials used, 31.68; value of product at works, 67.15.

The management of the Hubbard Iron Mill, at Youngstown, O., denies the report that the company intend to work steel billets instead of iron, and to make a change in the product of the mill. The mill is working full with plenty of orders on

THE KING BRIDGE COMPANY,

CLEVELAND, O.

Iron and Steel Bridges, Roofs, Girders, Buildings and Structural Work of all kinds, Hoisting and Conveying Machinery for Handling Ore, Coal, Etc.

hand. A 100-horse power Cook boiler is being put in and other improvements are being made.

In accordance with a decree of Judge Bruce, of the Federal Court, at Birmingham, Ala., the works of the United States Rolling Stock Co., at New Decatur and Auniston, Ala., will be sold Nov. 7, unless $1,185,000, which they owe the Central Trust Co., of New York, is paid before that time.

The stockholders of the Fort Payne (Ala.) Coal & Iron Co., at a meeting at New York City to consider plans for reorganization, heard the report of the receiver, Mr. W. K. Sheldon, of Fort Payne, showing that the concern's debts, less assets, amounted to about $400,000. A committee to devise ways and means of reorganization was appointed.

At the office of the Supervising Architect, Treasury Department, Washington, D. C., sealed proposals will be received until 2 P. M., Nov. 16, 1892, for all the labor and material required for the excavation, foundations, stone and brick work, floor and roof construction, roof covering, etc., for the U. S. Custom House and postoffice building, at St. Albans, Vt.

The Chester Pipe & Tube Co. have filed suit against the Lima Natural Gas Co., for the appointment of a receiver. Plaintiffs claim that the gas company is insolvent; that it has paid dividends to stockholders but has set aside no funds to pay the $100,000 first mortgage bonds held by the pipe company, due Nov. 1. The motion will be heard in Cleveland Nov. 5.

The Minerva blast furnace at Bay View, Wis., operated by the Badger Furnace Co., is in good working order, after the

Where to Locate New Factories

Is the title of a 150-page pamphlet recently published by the Passenger Department of the Illinois Central Railroad, and should be read by every mechanic, capitalist and manufacturer. It describes in detail the manufacturing advantages of the principal cities and towns on the line of the Southern Division of the Illinois Central and the Louisville, New Orleans & Texas Railroads, and indicates the character and amount of substantial aid each city or town is willing to contribute. It furnishes conclusive proof that the South possesses advantages for the establishment of every kind of factory working wool, cotton, wood or clay. For a free copy of this illustrated pamphlet address Mr. J. F. Merry, Assistant General Passenger Agent I. C. R. R., Manchester, Ia. 4

Harvest Excursions via Pennsylvania Lines.

On Sept. 27th excursion tickets to points in the Northwest, West, Southwest and South, and on Oct. 25th to points in the South and Southwest will be sold from principal ticket stations on the Pennsylvania Lines West of Pittsburgh. The Pennsylvania is the desirable route, being direct and offering excellent service. The rate will be low and the advantages afforded via these lines cannot fail to make the journey over them a pleasant one. For details apply to nearest Pennsylvania Line ticket agent or address F. Van Dusen, Chief Assistant General Passenger Agent, Pittsburgh, Pa.

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expenditure of $100,000 in improvements. The stack has been relined, the blowing engines have been entirely rebuilt by the E. P. Allis Co., and the old pipe stove has been replaced with two Hugh Kennedy brick stoves. Forsythe, Hyde & Co., well known Chicago iron dealers, are leading members of the operating company. A special grade of all-ore foundry iron, to be known as Minerva, will be made.

President Booth, of the Lloyd Booth Co., Youngstown, O., which recently leased the Ætna works, at Warren, O., after organizing the Ætna Machine & Foundry Co., is quoted by the Youngstown *Vindicator*: "It looks now very much as if we would have to either buy or lease another plant to help us out on the many large contracts we have received, as we have not time to erect any buildings. Our present contracts will keep us running full until February or March. If our business is an indication of what is going on elsewhere, certainly the country must be in a prosperous condition. In 25 years' experience we have never been so rushed with orders, or received as many inquiries from parties who desire to have us build machinery for them." The Ætna works have been run to their full capacity and the company's Youngstown plant has been operated double turn.

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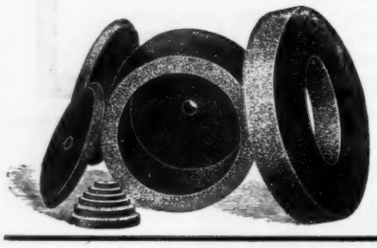

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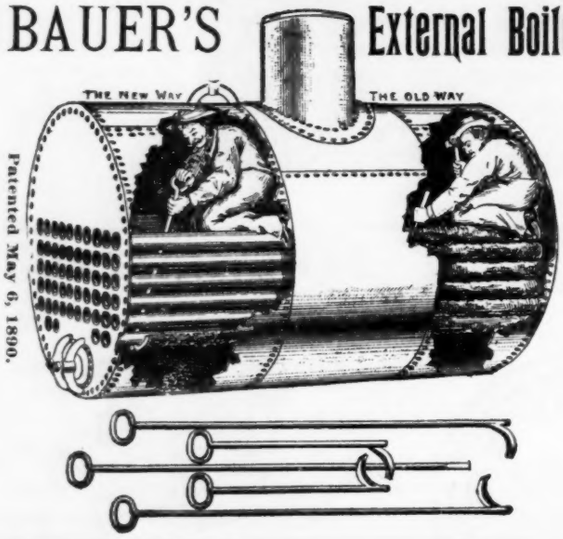

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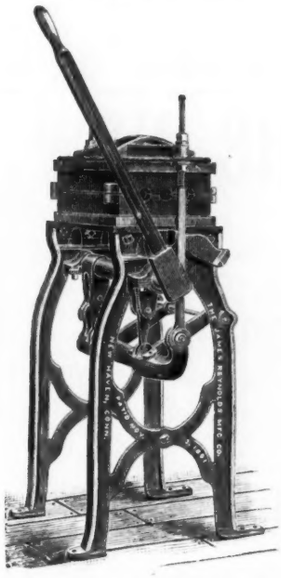

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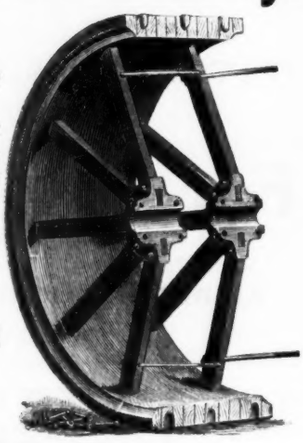

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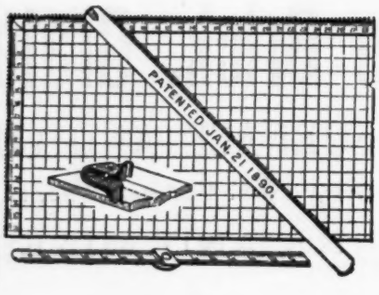

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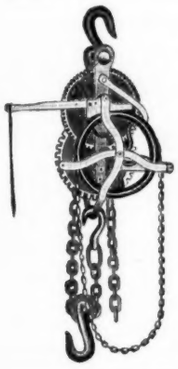

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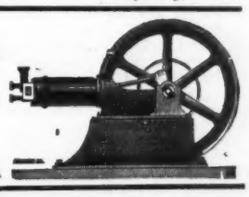

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Southern Coke No. 2	12 25@ 12 50
Southern Coke No. 3	11 75@ 12 00
Southern Charcoal No. 1	16 00@ 17 00
Southern Charcoal No. 2	15 00@ 15 50
Missouri Charcoal No. 1	17 00@ 17 50
Missouri Charcoal No. 2	16 50@ 17 00
Neutral Coke	11 50@ 12 00
Cold Short	11 25@ 11 50
Mottled	10 75@ 11 00
Southern (standard brands)	20 00@ 21 00
Southern (other brands)	18 50@ 19 50
Lake Superior	19 50@ 20 50
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$14 50@$14 75
Southern Coke No. 2	13 25@ 13 50
Southern Coke No. 3	12 75@ 13 00
Southern Grey Forge	12 25@ 12 50
Southern Charcoal No. 1	16 00@ 16 50
Southern Charcoal No. 2	15 00@ 15 50
Missouri Charcoal No. 1	14 50@ 15 00
Missouri Charcoal No. 2	14 00@ 14 50
Ohio Softeners	16 50@ 17 00
Lake Superior	18 00@ 18 25
Southern	18 50@ 18 75
Connellsville Coke, St. Louis	5 65
DETROIT (reported by William F. Jarvis & Co.):	
Lake Superior Charcoal, all numbers	$16 50@$17 00
Lake Superior (coke) Bessemer	16 00@ 16 50
Lake Superior Coke, Foundry, all ore	16 00@ 17 00
Standard Ohio Black Band	16 50@ 17 00
Southern No. 1	14 50@ 15 00
Southern Grey Forge	12 50@ 13 00
Jackson County (Ohio) Silvery	17 75@ 18 25

OLD RAILS AND SCRAP METAL.

	GROSS TONS
Old iron rails	$18 00
Old steel rails	12 00
	NET TONS
No. 1 R. R. wrought scrap	$15 50
No. 1 wrought scrap	14 00
No. 1 Machine cast scrap	10 00
Iron axles	20 00
Axle turnings	11 00
Wrought turnings (free from cast)	8 50
Cast borings	6 25
Uncut wrought iron boilers	9 00
Steel boiler Plates	13 00
Grate bars	6 50
Pipes and flues (clean)	9 50
Tank iron	10 60
Hoop and band iron	8 00
Sheet iron	7 00
Wrought drillings	8 00
Malleable iron	9 00

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. mill)	2.10c@2.25c
Angles	1.85c@1.90c
Tees	2.50c
Universal Plates	1.85c
Sheared Plates	1.95c

MERCHANT IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 70
1¼ to 6 by ⅜ to 1 inch	1 75
1¾ to 6 by 1⅛ to 2 inch	1 90
1¼ & 1⅜ by ⅜ to ¾ 1nch	1 75
1 & 1⅛ by ⅜ to ¾ inch	1 80
⅝, ⅜, ⅞, by ⅜ to ⅝ inch	1 90

Round and Square.

1 to 1⅞ inch	1 70
2 to 2⅝ inch	1 80
2¾ to 3¼ inch	1 95
3⅜ to 4 inch	2 20
4¼ to 4½ inch	2 80
4¼ to 5 inch	3 05

Oval.

⅞ to 1¼ inch	1 90
⅝ to ¾ inch	1 90
½	2 10
⅜	2 30

Half Oval and Half Round.

1½ to 3 inch	2 25
⅞ to 1½ inch	2 05
⅝ to ¾ inch	2 30
½	2 45
⅜	3 55

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 80
1 to 1⅜ by ¼ and 5-16 inch	1 85
¾ to ⅞ by ¼ and 5-16 inch	1 95
½ to ⅝ by ¼ and 5-16 inch	2 20

Hoops.

1¼ to 4, Nos. 13 to 15	2 40
1¼ to 2, Nos. 16 to 18	2 45
1¼ to 2. No. 19	2 50
1¼ to 2, No. 20	2 50
1¼ to 2, No. 21	2 60
1¼ to 2, No. 22	2 70
15-16, 1 and 1⅛, Nos. 13 to 15	2 45
15-16, 1 and 1⅛, Nos. 16 to 18	2 50
15-16, 1 and 1⅛, Nos, 19 and 20	2 60
15-16, 1 and 1⅛, No, 21	2 70
15-16, 1 and 1⅛, No. 22	2 80
⅞, Nos. 13 to 15	2 60
⅞, Nos. 16 to 18	2 70
⅞. Nos. 19 and 20	2 80
⅞, No. 21	2 90
⅞, No. 22	3 00
13-16, Nos. 13 to 15	2 70

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MACHINERY, ETC.

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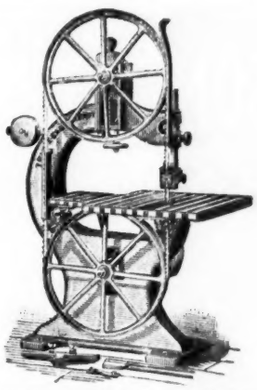
INTRODUCERS.
CONSTRUCTORS.



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All fitted with our new Roller Guide, which prevents the blades from breaking, etc.

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Catalogue Now Ready.

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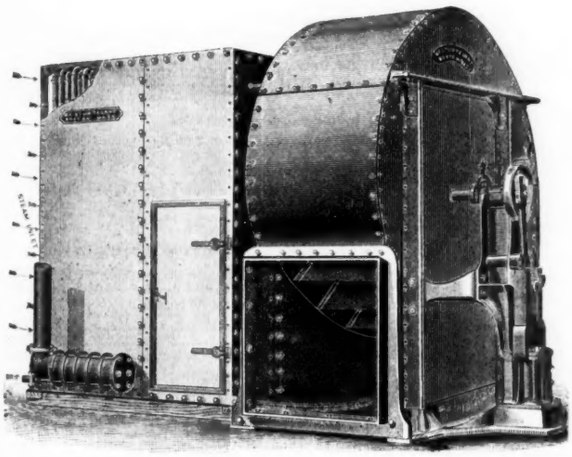
Nos. 251 to 271 W. Front St., CINCINNATI, OHIO.



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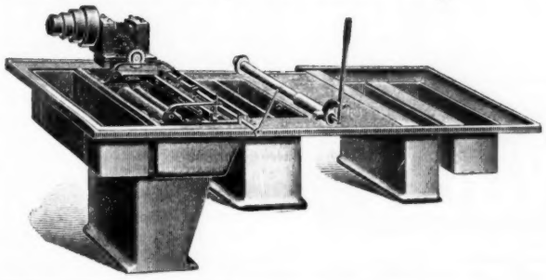

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No. 25 Press.

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FOR BAR AND SHEET METALS. DIES FOR ALL KINDS OF WORK.

Mention this paper. SEND FOR ILLUSTRATED CIRCULARS.

Oak and Superior Sts., TOLEDO, OHIO.

13-16, Nos. 16 to 18	2 80
13-16, Nos. 19 and 20	2 90
13-16 No. 21	3 00
13-16, No. 22	3 10
¾, Nos. 13 to 15	2 80
¾, Nos. 16 to 18	2 95
¾, Nos. 19 and 20	3 05
¾, No. 21	3 15
¾, No. 22	3 25
11-16, Nos. 13 to 15	3 05
11-16, Nos 16 to 18	3 10
11-16, Nos. 19 and 22	3 20
11-16, No. 21	3 30
11-16, No. 22	3 40
⅝, Nos. 13 to 15	3 10
⅝, Nos. 16 to 18	3 20
⅝, Nos. 19 and 20	3 30
⅝, No. 21	3 40
⅝, No. 22	3 50
⅝, No. 23	3 60

Light Band.

1½ to 6 by ⅛ to 3-16 inch	1 95
1½ to 6 by Nos. 11 and 12	2 00
1 to 1⅜ by ⅛ to 3-16 inch	2 00
1 to 1⅜ by Nos. 11 and 12	2 05
⅞ and 13-16 by ⅛ to 3-16 inch	2 15
⅞ and 13-16 by Nos. 11 and 12	2 20
¾ and 11-16 by ⅛ to 3-16 inch	2 30
¾ and 11-16 by Nos. 11 and 12	2 35
⅝ and 9-16 by ⅛ to 3-16 inch	2 45
⅝ and 9-16 by Nos. 11 and 12	2 50
½ by ⅛ to 3-16 inch	2 60
½ by Nos. 11 and 12	2 65

Wagon Box Iron.

⅛ inch, beveled edge, by Nos. 11 and 12	2 20
⅞ inch, " " " " 13 and 14	2 30
¾ inch, " " " " 11 and 12	2 35
¾ inch, " " " " 13 and 14	2 55

Sheet Iron.

No. 10 to 14	2 30
No. 15 to 17	2 45
No. 18 to 21	2 60
No. 22 to 24	2 70
No. 25 to 26	2 80
No. 27	2 90
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 25
C No. 1, " "	2 40
C H No. 1, " "	2 50
C H Flange, " "	3 50
Extra Flange "	4 00
Solid Fire Box "	4 75

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 25
Shell	2 50
Flange	2 75
Marine Flange	3 00
Fire Box	4 00

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	8
9-16 to ½ in. "	08½
7-16 to ⅜ and 2⅜ to 3 in	09
3⅛ to 4 in	09½
⅝ to 11-16 and 4½	10
⅛ to 6 in	10½
¼ to 9-32 and 6⅛ to 7 in	11
3-16 in	13

Flats.

	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	8

Bessemer and O. H. Steel.

Machinery	base price.
Tire	" 2 25
Spring	" 2 80
Sleigh Shoe	" 2 50
Toe Calk	" 2 35
Cutter Shoes, tapered and bent	" 2 75

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	4 00
Bridge ½, ⅝, 11-16 and ¾ inch diam	4 00

MACHINERY SUPPLY MARKET.

Anvils.

American	₩ lb 9@10
Wright's	₩ lb 12

Bellows.

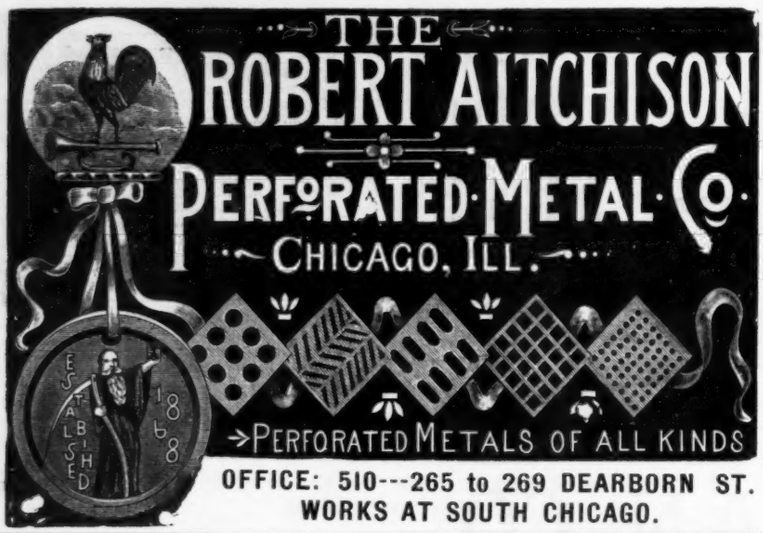
Blacksmiths' { Hill's	dis 40
Blacksmiths' { Bullock's	dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single	dis 40
Munson's Short Lap Single Leather	dis 45
Munson's Short Lap Double and Light Double Leather	dis 50
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40



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Torches, - -

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Platform, 90" long, 27¾" wide; made of best seasoned hickory, with slat top. Weight, 350 pounds. For particulars address

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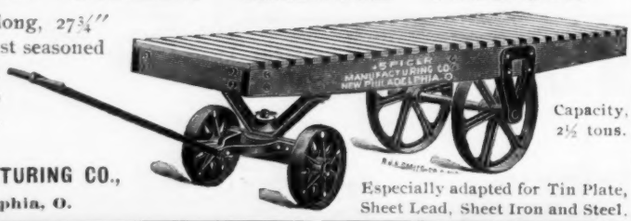

Capacity, 2½ tons.

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THE GREAT STUMP AND ROCK
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STRONGEST and SAFEST EXPLOSIVE
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POWDER, FUSE, CAPS,
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FOR SALE BY THE
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40 Prospect Street, Cleveland, Ohio.
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Borax.

	℔ lb 12½

Chalk.

White	℔ gross 50
Blue	℔ gross 85
Red	℔ gross 70
White Crayon	℔ gross 12@12½ dis 10

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 30
Horton's Universal	dis 40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 35

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	℔ lb 3½
Iron, steel points	℔ lb 3½

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	Flour, C. F F, FF.
Kegs, ℔ lb	4½c	5 c	2½c
½ kegs ℔ lb	4¾c	5¼c	2¾c
¼ kegs ℔ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans, less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton,	dis 50@50&5

Emery Wheels.

Detroit	dis 55@60
Norton's	dis 55@60
Grant	dis 55@60
Sterling	dis 60
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60
Vulcanite	dis 60&10
Hamden	dis 60&10
Cyclone	dis 60

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works, Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	15c
" " " " over 5 lbs	12c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¼	4	3¼	3½
Hexagon	15½	11½	8½	6	5¾	5¼	5
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ℔ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 75
Standard Penny Nails, ℔ keg card rate	
{ Car lots	$1.70
{ Less than car lots	$1.80

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ℔ doz	dis 10@10&10

Packing, Steam.

Boston Belting Co.	dis 60
American Packing Hemp	℔ lb 9@10
Russia " "	℔ lb 14
Italian " "	℔ lb 13@19
Plumbago Piston	℔ lb 40
Peerless	℔ lb 60
Morrison's "	℔ lb 50
Square Flax "	℔ lb 50
Sheet Rubber	℔ lb 12&24
Excelsior Rubber	℔ lb 48
Rainbow { Full Rolls	50c ℔ lb
Rainbow { Less than Full Rolls	60c ℔ lb

For Sale for Cash, or Credit on Car Trust.

20 Second-Hand Standard Passenger Coaches.
30 New Standard Gauge Passenger Coaches, built at one of the best works in the United States. All modern improvements. Price, $3,700 each. Now ready to letter.
40 Second-Hand Narrow Gauge Locomotives, different sizes.
Second-Hand Standard Gauge Locomotives, different sizes.
Second-Hand Box Cars 20 tons capacity, liberal terms.

These Locomotives have been overhauled all in good condition, ready for immediate delivery.
1,000 tons of 40-lb. second-hand steel and iron rails.
800 tons of 35-lb iron and steel rails, second hand.
1,200 tons of 40-lb. iron and steel rails. All these rails are in good order.
Also 9 Sleeping Cars suitable for theatrical purposes, second-hand. 70 Box Cars and 70 Coal Cars, 20 tons capacity each, second-hand.
Southern and Western Delivery.

Agent for Wm. B. Pollock & Co.'s Oil Tank Cars, for sale at lowest possible prices. Photos and and specifications sent with prices if desired. Bonds negotiated on new and old roads. Long roads preferred.

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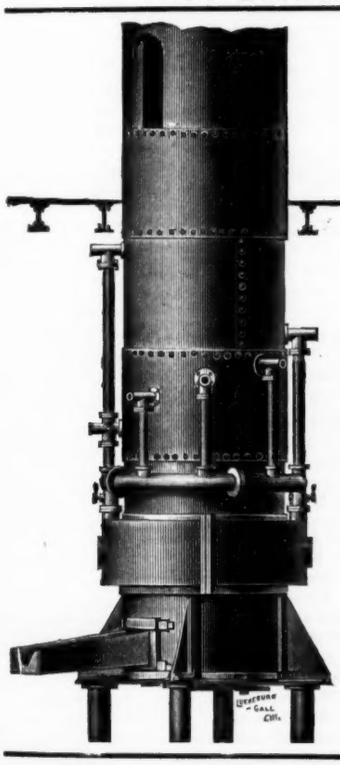

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Patent Economical

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10 to 50 Per Cent. Saving in Fuel,

With Corresponding Increase in Quality of Iron Melted, Over any Existing Cupola.

15 Per Cent Saving Guaranteed.

Can be Applied to any Type of Cupola Now in Use.

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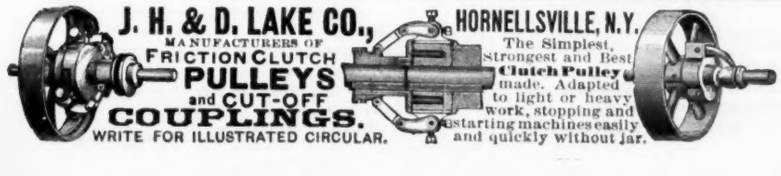

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WRITE FOR ILLUSTRATED CIRCULAR.

HORNELLSVILLE, N.Y.
The Simplest, Strongest and Best **Clutch Pulley** made. Adapted to light or heavy work, stopping and starting machines easily and quickly without jar.

Eclipse Gasket..... ℔ lb 75

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 40
Medart Pulleys.....dis 50
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17.....dis 40@40&10
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 40@40&10
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....℔ lb 12½
Sisal, ¼ inch and over.....℔ lb 11½

Sand Paper.

B. A. & Co.....dis 50@50&5
H. H. Barton's.....dis 40@45
New England Flint.....dis 50@50&5
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40&10
" Band.....dis 25
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Diston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws.....dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws..... 70c per ft
" Dexter Cross-cuts..... 50c "
" Diamond " ..... 30c "
" Tuttle Tooth Cross-cuts..... 25c "
" One-man Cross-cuts..... 32c "
No. 1 Handles..... 23c per pair
No. 6 " ..... 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 70
Round head iron.....dis 65
Flat head brass.....dis 70
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set.....dis 70
Set C. H C. P.....dis 70
Machine, flat head, iron.....dis 65&10
Machine, round head, iron.....dis 60&10
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....per doz 5.25
Hussey & Binns, railroad.....per doz 8 00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list.....dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 55
Pulley Taps.....dis 40

Twine. BC. B.

No. 12, Flax Twine, ¼ and ½ lb Balls.....21c@29c
No. 18, " " ¼ and ½ lb " .....18c@28c
No. 36, " " ¼ and ½ lb " .....16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine).....11½c
3-Ply " 1 lb Balls.....12@12¼c
3-Ply " 1½ lb Balls.....11@11¼c
Cotton Wrapping, 5 Balls to lb.....15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

New List, Jan. 18, 1884

Brass.....dis 30
Copper.....dis 40
Bright and annealed, Nos. 0@18.....dis 70&10@75
" " Nos. 19@26.....dis 75@75& 5
" " Nos. 27@36.....dis 75&10& 5
Coppered Nos. 0 to 18, market list.....dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis65& 5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....95c ℔ lb dis 30

Wrenches.

Coe's genuine.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanic's.....dis 55&10& 5
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 50

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G. P. Rowell & Co., New York.

Advertising Specialties—
Clark & Co., Chicago, Ill.

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Magnolia Anti-Friction Metal Co., New York.
Grant Anti-Friction Ball Co., Fitchburg, Mass.

Automatic Stokers.—
Brightman Stoker Co., Cleveland, O.

Anglers and Tees
Aetna Iron & Steel Co., Bridgeport, O.

Architectural Iron Work
The King Bridge Co., Cleveland, O.

Bolts and Bolt Machinery—
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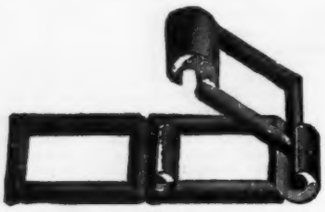

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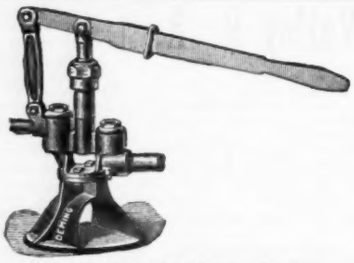

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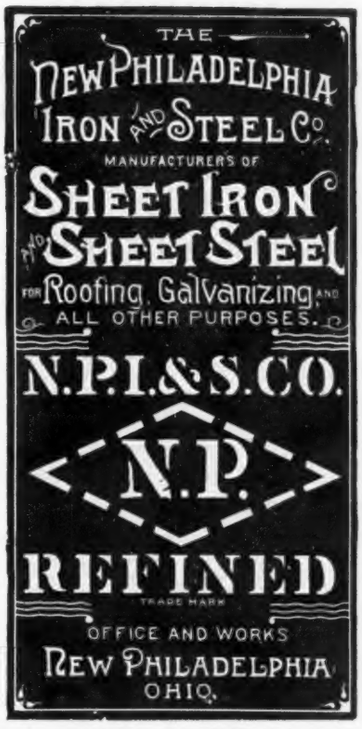

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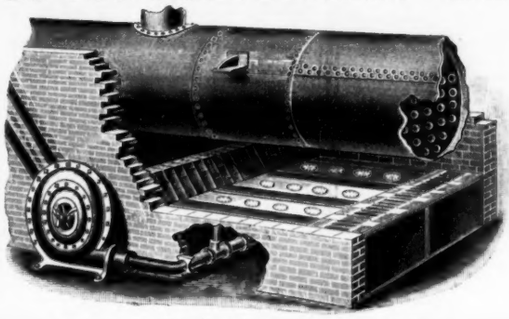

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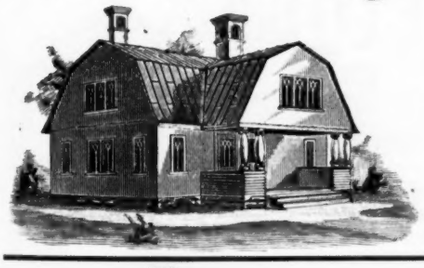

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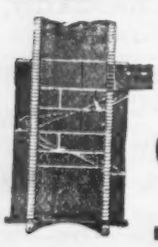

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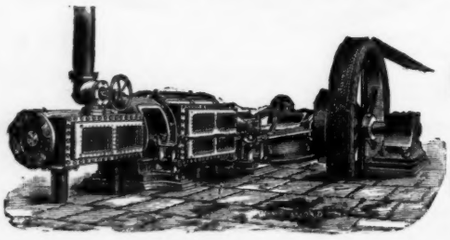

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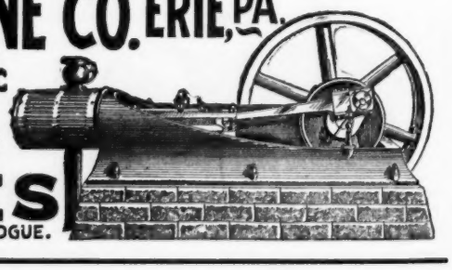

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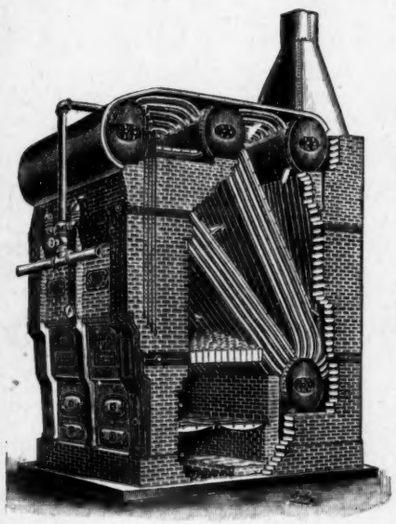

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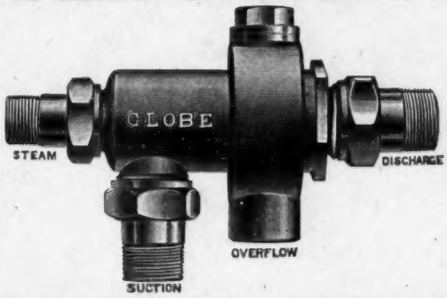

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